NL INDUSTRIES/TARACORP SUPERFUND SITE GROUP
LEED ENVIRONMENTAL, INC.
124 Deborah Drive
Reading, PA 19610
Telephone: (610) 670-7310
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September 28, 2001

First Class Mail

Mr. Brad Bradley
U.S. Environmental Protection Agency
77 West Jackson Boulevard
Chicago, IL 60604-3590

RE: NL Industries/Taracorp Superfund Site; Granite City, Illinois
Groundwater Monitoring Plan

Dear Mr. Bradley:

Attached are two copies of revised page 15 to the Groundwater Monitoring Plan, NL Industries/Taracorp Superfund Site, Granite City, Illinois, which was submitted to your office on December 29, 2000 by ARCADIS Geraghty & Miller ("ARCADIS") on behalf of the NL Industries/Taracorp Superfund Site Group. The text in items 5 and 6 on page 15 has been revised by ARCADIS to address the two comments provided in your August 16, 2001 letter which approved the Groundwater Monitoring Plan.

The two copies of revised page 15 have been pre-punched to facilitate insertion of the revised page into your copies of the December 29, 2000 Groundwater Monitoring Plan.

Thank you for your assistance. Please advise if clarification or additional information is needed.

Very truly yours,

LEED ENVIRONMENTAL, INC.

Jeffrey A. Leed
Project Coordinator

attachment
cc: Ms. Sandra Bron - Illinois EPA (w/attachment, by first class mail)
Mr. Jack Kratzmeyer - ARCADIS Geraghty & Miller (w/attachment, by first class mail)
Technical Committee, NL Industries/Taracorp Superfund Site Group
(w/attachment, by first class mail)

cil/granitecitybradley.02

ARCADIS GERAGHTY & MILLER

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ENVIRONMENTAL SERVICES

VIA MESSENGER
U. S. Environmental Protection Agency
77 West Jackson Boulevard, HSRW-6J
Chicago, Illinois 60604-3590

Attention: Mr. Brad Bradley and Ms. Sheri Bianchin

Subject:
Retransmittal of Groundwater Monitoring Plan
NL Industries/Taracorp Superfund Site
Granite City, Illinois
ARCADIS Geraghty & Miller Project No. CI001003.0005

Chicago, Illinois
12 February 2001

Contact:
Jack Kratzmeyer

Extension:
312.425.4114

Dear Mr. Bradley and Ms. Bianchin:

At the request of Mr. Jeff Leed of Leed Environmental, Inc., ARCADIS Geraghty & Miller, Inc. is hereby resubmitting two (2) copies of the document entitled, "Groundwater Monitoring Plan, NL Industries/Taracorp Superfund Site, Granite City, Illinois. ARCADIS Geraghty & Miller had previously hand-delivered two (2) copies of this document to the agency on December 29, 2000, on behalf of the NL Industries/Taracorp Superfund Site Group.

If you should have any questions regarding this document, please do not hesitate to contact the undersigned.

Sincerely,

ARCADIS Geraghty & Miller, Inc.

Jack Kratzmeyer
Principal Engineer/Project Manager

Nicholas Valkenburg, C.P.G.
Vice President/Project Director

Enclosures (2): Groundwater Monitoring Plan

Copies:
Jeffrey Leed, Leed Environmental, Inc., w/o enclosure

Groundwater Monitoring Plan
NL Industries/Taracorp Superfund Site
Granite City, Illinois

ARCADIS GERAGHTY & MILLER

Address:
35 East Wacker Drive, Suite #1000
Chicago, Illinois 60601

CI001003.0005

December 2000

ARCADIS GERAGHTY & MILLER

Groundwater Monitoring Plan
NL Industries/Taracorp Superfund Site
Granite City, Illinois

December 29, 2000

Prepared by
ARCADIS Geraghty & Miller, Inc.

Adam Tokarski
Staff Scientist

Jack L. Kratzmeyer
Principal Engineer/Project Manager

Nicholas Valkenburg
Vice President /Project Director

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Appendices

1.0 Introduction

ARCADIS Geraghty & Miller, Inc. (ARCADIS Geraghty & Miller) has prepared this groundwater monitoring plan (Plan) on behalf of the NL Industries/Taracorp Superfund Site Group (Site Group). This Plan describes the groundwater monitoring activities that will be conducted at the NL Industries/Taracorp Superfund Site (Site) located in Granite City, Illinois (Figure 1). The work will be performed in accordance with the Explanation of Significant Differences (ESD) issued by the U.S. EPA on September 9, 2000. The ESD documents the U.S. EPA's selection of groundwater monitoring as the final groundwater remedy for the NL Industries/Taracorp Superfund Site. A copy of the ESD is provided for reference in Appendix A of this Plan.

The groundwater monitoring remedy selected in U.S. EPA's September 9, 2000 ESD replaces groundwater containment, which was previously identified as the groundwater remedy for the Site in a Decision Document/Explanation of Significant Differences (DD/ESD) issued by the U.S. EPA on September 29, 1995. The agency's decision to issue an ESD and modify the groundwater remedy was based on the results of the recently completed pre-design groundwater investigation performed by ARCADIS Geraghty & Miller on behalf of the Site Group.

The pre-design investigation included the installation of new off-site monitoring wells at the Main Industrial Site and Remote Fill Areas (i.e., Venice Township and Eagle Park Acres), redevelopment or replacement of several existing monitoring wells at the Main Industrial Site and collection of two rounds of groundwater samples from both the new and existing monitoring wells for analysis of the Target Analyte List (TAL) metals. The results of the pre-design groundwater investigation are presented in the ARCADIS Geraghty & Miller document entitled, "Pre-Design Investigation Report for Groundwater, NL Industries/Taracorp Superfund Site, Granite City, Illinois," dated September 2000.

1.2 Pre-Design Investigation Results

The results of groundwater sampling and analysis performed during the pre-design groundwater investigation resulted in the following significant findings.

Remote Fill Areas

- Lead was not detected in the groundwater samples collected from wells installed in Venice Township (GMMW-117, GMMW-118, and GMMW-119) and from wells installed in Eagle Park Acres (GMMW-120, GMMW-121, and GMMW-122) during either of the two groundwater sampling rounds conducted during the Pre-Design Investigation.

Main Industrial Site

- Historical groundwater elevation data collected during the remedial investigation indicated a south-southwesterly flow direction in the surficial aquifer. Groundwater elevation data collected during the Pre-Design Investigation showed a similar flow pattern.

- Lead concentrations in the low-flow unfiltered samples slightly exceeded the Illinois Class I groundwater protection standards at several distinctly separate locations on the Main Industrial Site–including several locations that would not be impacted by the Taracorp pile based on the observed groundwater flow directions at the Site. Also, for all of the groundwater samples where the low-flow unfiltered data exceeded the Class I standards for lead, all of the results from the same monitoring wells collected by low-flow filtered techniques showed lead concentrations that were below analytical detection limits, suggesting that the lead is not migrating even if it is present at certain locations in a suspended form.

- Samples collected using bailers consistently showed higher concentrations of lead than samples collected using low-flow sampling methods in those monitoring wells where lead was detected. These results confirmed that lead concentrations in groundwater are strongly correlated to the presence of suspended solids in the groundwater samples, which is directly related to the methodology used for sample collection.

- Lead was not detected in low-flow unfiltered samples from off-site downgradient wells installed at the Granite City Steel facility (GMMW-115, GMMW-124, and GMMW-125) and from the well installed on Terminal Railroad of St. Louis property (GMMW-116) during either of the two groundwater sampling rounds, confirming that lead has not migrated off the Main Industrial Site.

Based on these findings, ARCADIS Geraghty & Miller concluded that the relatively low-levels of lead that have been detected in monitoring wells in the former source areas at the Main Industrial Site are not mobile in groundwater and have not migrated offsite. This conclusion is based on reproducible analytical results that were obtained during two separate groundwater sampling events performed during the 2000 Pre-Design Investigation.

1.2 Purpose

The groundwater monitoring plan presented herein, describes the sampling and analysis that will be performed to monitor long-term groundwater quality at the Site. The proposed groundwater monitoring plan will provide documentation of groundwater quality and verification that the action levels for lead, cadmium and zinc are not exceeded in off-site monitoring wells. The action levels for lead, cadmium, and zinc are 0.015 milligrams per liter (mg/L, or parts per million), 0.005 mg/L and 5.0 mg/L, respectively.

This plan references field sampling protocols that are based on the low-flow sampling procedures that were implemented at the Site during the pre-design groundwater investigation.

1.3 Organization of Groundwater Monitoring Plan

This groundwater monitoring plan is organized into the following sections:

Section 1.0 Introduction, consists of a brief description of the objectives of the groundwater monitoring plan. The remaining sections of this monitoring plan are described below.

Section 2.0, Groundwater Monitoring Well Network, identifies the monitoring wells that comprise the monitoring well network for the Site.

Section 3.0, Groundwater Sampling, describes sampling protocol, field analyses, quality control, record documentation, analytical parameters, analytical methods, and the sampling equipment to be used during groundwater monitoring activities.

Section 4.0, Contingency Plan, describes the procedures to be followed in the event that monitoring results indicate exceedances of the action levels established for the Site.

Section 5.0, References

2.0 Groundwater Monitoring Well Network

Groundwater samples will be collected on an annual basis from the existing groundwater monitoring well network and analyzed for lead, cadmium and zinc, in order to monitor any changes in groundwater quality at the Site. The upper end of the range of groundwater flow velocities at the Site reported during the remedial investigation was 0.5 ft/day, or roughly 180 ft/year (O'Brien & Gere 1998). The distance between the nearest downgradient property boundary at the Site and the edge of the closed Taracorp pile is over 300 feet. The corresponding time for groundwater to travel this distance assuming a groundwater flow rate of 0.5 ft/day is on the order of two years (1.7 years). Consequently, sampling on an annual basis is more than adequate to detect any potential changes in groundwater quality at the Site, that might impact downgradient groundwater quality.

Based on the results of the groundwater sampling performed during the Pre-Design Investigation, lead, cadmium, and zinc have been selected as the analytical parameters for groundwater samples collected from the monitoring wells at the Main Industrial Site during implementation of this plan. Lead, cadmium, and zinc were the most frequently detected analytes with the highest quantified concentrations in groundwater samples collected from the Main Industrial Site during the Pre-Design Investigation. The groundwater samples collected from the monitoring wells in the Remote Fill Areas (i.e., Venice Township and Eagle Park Acres) will be analyzed for lead.

The annual groundwater sampling events conducted during the implementation of this plan, will be scheduled at different times of the year to account for potential seasonal variations in groundwater elevations at the site.

The existing monitoring well network consists of a total of thirty-five (35) wells located at the Main Industrial Site and the Remote Fill Areas (i.e., Venice Township and Eagle Park Acres). A list of the monitoring wells that comprise the monitoring well network is presented in Table 1. Monitoring Well Construction Diagrams for each of the wells installed during the Pre-Design Investigation are provided for reference in Appendix B. The well construction details for each of the 35 wells in the monitoring well network are summarized in Table 2.

Twenty-three (23) of the wells in the monitoring well network are new and replacement monitoring wells installed as part of the pre-design groundwater investigation. The locations of the new and existing monitoring wells that will be

sampled during the implementation of this plan are shown on Figures 2 through 7. Seventeen of the new monitoring wells are located at the Main Industrial Site, including a total of eight new wells at off-site locations on adjacent downgradient properties. Monitoring well nests GMMW 115 and GMMW 124 (shallow and deep) and one shallow monitoring well (GMMW 125) are located west of the Main Industrial Site (Figures 2 and 3) at the Granite City Steel Division of the National Steel Corporation (Granite City Steel). Monitoring well nest GMMW 116 (shallow and deep) was installed northwest of the Main Industrial Site on Terminal Railroad Company of St. Louis property (Figure 2). A shallow monitoring well (Figure 4) was also installed northwest of the Main Industrial Site on Granite City public right-of-way near Walnut and Niedringhaus Streets (GMMW 126).

Three new shallow monitoring wells are located in each of the Remote Fill Areas (Venice Township and Eagle Park Acres). The locations of new Monitoring Wells GMMW 117, GMMW 118 and GMMW 119 installed during the Pre-Design Investigation in Venice Township are shown on Figure 5. Figure 6 shows the locations of three new shallow monitoring wells (GMMW 120, GMMW 121 and GMMW 122) that were installed in Eagle Park Acres during the Pre-Design Investigation.

Laboratory analysis of groundwater samples collected from the monitoring wells will be conducted to monitor the concentrations of lead, cadmium, and zinc, and assess changes in groundwater quality. The groundwater monitoring plan includes groundwater sampling from the water table elevation at the shallow (S) monitoring wells (20 to 25 ft bgs), from 35 to 45 ft bgs at the deep (D) monitoring wells, and from approximately 50 ft bgs at the deeper (X) monitoring wells.

3.0 Groundwater Sampling

During the implementation of this plan, groundwater samples will be collected from all of the wells in the monitoring well network (refer to Table 1) for laboratory analysis of lead, cadmium, and zinc and field measurements of indicator parameters (i.e., pH, temperature, specific conductivity, turbidity, and oxidation/reduction potential). Groundwater sampling and analysis activities conducted under this Plan will be performed in accordance with the approved Quality Assurance Project Plan (QAPP) for the Site (ARCADIS Geraghty & Miller 1999).

Groundwater samples will be collected from the monitoring well network on an annual basis for three (3) years in 2001 (Spring), 2002 (Summer), and 2003 (Winter). After completion of three years of groundwater monitoring, ARCADIS Geraghty & Miller will assess the appropriate frequency for further monitoring. ARCADIS Geraghty & Miller's assessment will also evaluate whether certain monitoring wells may be closed and eliminated from further monitoring. ARCADIS Geraghty & Miller's assessment and recommendations will be provided to U.S. EPA for consideration.

The groundwater samples will be submitted to the approved project laboratory for analysis of lead, cadmium, and zinc (Table 3). The groundwater samples will be collected using low-flow sampling methods and will be analyzed by the project laboratory for total lead, cadmium, and zinc (i.e., unfiltered samples). Groundwater samples will be collected using low-flow sampling methods to minimize the turbidity of the groundwater samples.

The field procedures that will be followed during the groundwater sampling activities are discussed in the following sections.

3.1 Preparation of Well for Sampling

3.1.1 Sounding the Well

Upon arrival at the well location, sampling personnel will check the well for damage, record the well designation, wipe the top of the well clean, and then remove the cap and wipe the top of the well casing with a clean cloth. The condition of the well will be recorded in the field notebook by the sampling team.

The total depth of the well to be sampled will be measured (sounded) prior to sampling. This will enable the sampling team to calculate the volume of standing

water in the well and to determine if formation solids have passed through the screen and accumulated in the well. The well depth will be measured to an accuracy of ± 0.1 feet.

The height of the measuring point above ground surface (the stick-up) will be measured as an indicator of whether the well has been disturbed since installation. The stick-up will be measured to an accuracy of ± 0.1 feet.

3.1.2 Measuring the Water Level

Prior to sampling, the static water level in the well will be measured and the volume of standing water in the well will be calculated. Each measurement will be made to an accuracy of ± 0.01 feet below the measuring point. The order of water level measurements will be from wells with lower detected concentrations, to those with known higher constituent concentrations.

3.1.3 Purging the Well

Standing water will be removed from any flush-mount well casings prior to sampling. The monitoring well will be purged using a low-flow submersible pump. The pump will be decontaminated using a pressurized steam cleaner between well locations. New disposable tubing will be used with the pump at each well location.

At a minimum, a purge volume equal to three times the calculated volume of standing water in the well will be removed to ensure that the sample collected will be representative of the groundwater within the zone screened. During purging, the field parameters pH, temperature, specific conductance, and turbidity will be measured after each well volume has been removed from the well using an in-line, flow-through cell. Additional purging may be required to ensure that the field measurement parameters have stabilized before the well is sampled. The field parameters will be considered stable when two successive measurements vary by less than 0.5 degrees Celsius for temperature, 10% for conductance and turbidity, and 0.5 pH units. The unit of measurement for turbidity will be Nephelemetric Turbidity Units (NTUs).

The volume of standing water in each well will be calculated using the following equation:

$$V = \pi (r^2) (h) (7.48)$$

where:

V = well volume (gal)
r = well radius (ft)
h = column of water in the well (total depth - depth to water) (ft)

Purge water will be containerized from wells at the Main Industrial Site that are located in the vicinity of the former source area (i.e., Monitoring Wells MW-101. MW-104, and GMMW-108S, D, X), or from wells that are located in areas of the Main Industrial Site that contained waste materials that were consolidated in the closed Taracorp pile (Monitoring Wells GMMW-112S, D). The purged water from these wells will be containerized and conveyed inside the fenced area at the former BV&G Trucking for temporary storage prior to characterization sampling and discharge to the City of Granite City sanitary sewer system. A grab sample of the purge water will be collected and analyzed for cadmium, lead, and zinc, cyanide, total phenols and pH.

The results of the laboratory analysis will be submitted to the City of Granite City Regional Wastewater Treatment Plant (WWTP) with a request for permission to discharge the purge water to the sanitary sewer system. The proposed sanitary sewer discharge point is the sewer manhole located at the 15th and State Streets. A copy of the authorization issued by the City of Granite City WWTP to discharge purge water generated during the pre-design groundwater investigation to the sanitary sewer system is provided in Appendix C.

The purge water from all other wells, including the monitoring wells in the two Remote Fill Areas (Venice Township and Eagle Park Acres), and the off-site monitoring wells at the Main Industrial Site will be allowed to infiltrate onto the ground at each location.

3.2 Field Analyses

During well purging and prior to groundwater sampling at each well, measurements for dissolved oxygen, oxidation/reduction potential, conductivity, pH, temperature, and turbidity will be made in the field using a YSI 6000 series meter, or equivalent.

3.3 Groundwater Sampling

The following groundwater sampling procedures will be followed under this Plan for low-flow sample collection using a submersible pump:

1. Measure the depth to water with an electronic water-level device from the top of casing and record the measurement in the logbook. Do not measure the depth to the bottom of the well at this time (in order to avoid disturbing any accumulated sediment). Obtain depth to bottom information from measurements collected prior to sampling.

2. Measure the depth to water in the well again. If the measurement has changed more than 1/10th of a foot, check and record the measurement again.

3. Attach and secure the discharge tubing to the low-flow submersible pump. Lower the pump slowly lowered into the well to prevent disturbing the water column. If the pump cannot be installed in the well due to an obstruction or damage to the well, a bailer may be used to sample the well.

4. The pump should be set at approximately the middle of the screen. Avoid placing the pump intake less than two feet above the bottom of the well as this may cause mobilization of any sediment present in the bottom of the well. Cover the discharge line between the flow-through cell and the well cap with foam insulation to minimize temperature change. Start purging the well. Avoid surging. Observe air bubbles displaced from discharge tube to assess progress of steady pumping until water arrives at the surface. Record the start time on the water sampling log.

5. The water level in the well should be monitored during purging, and ideally, the purge rate should equal the well recharge rate so that there is little or no drawdown in the well. (The water level should stabilize for the specific purge rate). There should be at least one foot of water over the pump intake so there is no risk of the pump suction being broken, or entrainment of air in the sample. Record adjustments in the purge rate and changes in depth to water. Purge rates should be decreased to the minimum capabilities of the pump to avoid affecting well drawdown. The well should not be purged dry. If the recharge rate of the well is so low that the well is purged dry, then wait until the well has recharged to a sufficient level and collect the appropriate volume of water for the sample with the pump.

6. During well purging, use the flow-through cell to monitor the field parameters every 3 to 5 minutes. If the field parameters fail to stabilize within two hours and three well volumes have not been purged, move the meter to the next well to be sampled and continue to purge the first well. Field parameters will be monitored every one to two hours until they stabilize or three well volumes are removed.

7. Once the field parameters have stabilized, collect the samples directly from the end of the discharge tube. All sample bottles should be filled by allowing the water from the discharge tube to flow gently down the inside of the bottle with minimal turbulence. Cap each bottle as it is filled. Record sample completion time on the sampling log.

8. Field equipment will be calibrated and operated in accordance with manufacturer's instructions. Documentation of calibrations will be recorded in the field log book. Copies of all instruction manuals for calibration and operation will be available for review by the sampling personnel at the Site.

3.4 Equipment Decontamination

Before the start of groundwater sampling activities, between each well sampled, and prior to leaving the Site, the groundwater sampling equipment will be decontaminated. The pump used to purge and sample the monitoring wells will be thoroughly cleaned between each well location.

The decontamination procedures for the submersible pump are presented below:

1. Personnel will wear disposable gloves during the decontamination procedures and will change gloves as necessary.

2. The submersible pump used to purge the well will be removed and placed along with the electrical cord, into a clean bucket. The equipment will be rinsed with distilled water.

3. The interior and exterior of the submersible pump will be rinsed with a laboratory-grade detergent solution. A scrub brush will be used on the pump and cord to remove surficial contaminants.

4. The pump and the electrical cord will be placed in a clean pail and the interior and exterior will be thoroughly rinsed with distilled water.

5. The distilled water used to rinse the pump and electrical cord will be changed for each decontamination procedure.

6. The clean pump and cord will be placed in a clean plastic bag.

If a peristaltic pump is used, no decontamination of the pump is necessary due to the non-contact nature of the groundwater sample. However, new dedicated tubing is needed for the pump between each monitoring well sample.

3.5 Quality Control Samples

The quality assurance/quality control program is defined to meet the quality assurance objectives described in the project QAPP. Site-specific control samples involve the collection of field replicates and equipment blanks. A summary of the sampling and analysis program to be performed during the implementation of this plan is presented in Table 4.

3.6 Sample Custody And Shipment

Sample custody procedures are defined in the project QAPP. They are designed to comply with U.S. EPA requirements for sample control. All samples will remain in the custody of sampling personnel from the time of collection until transfer to a representative of the courier service for delivery to the laboratory. Standard chain-of-custody procedures will be followed to maintain and document sample possession and transfer.

3.6.1 Field Custody

Detailed field-specific procedures, including field sample handling procedures and field log book documentation requirements, are described in the project QAPP.

3.6.2 Transfer of Custody for Shipment

Procedures for transferring custody of samples are detailed in the project QAPP.

3.6.3 Sample Shipment Procedures

As indicated in the project QAPP, the following procedures will be followed when shipping samples for laboratory analysis:

1. Samples requiring refrigeration will be promptly chilled to a temperature of between 1 and 4°C and packaged in an insulated shipping container or cooler on ice for transport to the project laboratory.

2. Only shipping containers which meet all applicable state and federal Department of Transportation standards for safe shipment will be used.

3. The Chain-of-Custody Record and Laboratory Task Order will be placed inside the shipping container in a sealed plastic envelope.

4. The shipping containers will be sealed with a Chain-of Custody seal that will allow the laboratory receiver to quickly identify any tampering which may occur during transport to the laboratory.

5. Shipment will be by courier service and receipt of shipment will be retained with Chain-of-Custody Record.

3.6.4 Laboratory Custody

Upon receipt of the samples at the laboratory, the laboratory custody procedures described in the project QAPP will be followed.

3.7 Data Validation

The overall quality assurance objective is to ensure that monitoring data of known and acceptable quality are obtained. To achieve this objective, sample collection and chain-of-custody procedures will be implemented to ensure that representative samples are collected for analysis. The analytical data will be validated together with the laboratory in accordance with the QAPP to ensure it meets precision, sensitivity, accuracy, completeness, representativeness, and comparability requirements. The laboratory deliverables provided for groundwater samples collected under this Plan will correspond to ARCADIS Geraghty & Miller's Level II deliverables for inorganic analyses (Appendix D).

3.8 Reporting

The results of the monitoring and sampling performed during the implementation of this plan will be documented in an Annual Report, which will be submitted to the U.S. EPA. The report will present the following information:

1. Description of field activities:
   - status and integrity of the monitoring well network; and
   - discussion of any changes in sampling protocol.
2. Summary of groundwater quality data:
   - validated analytical data summary tables;
   - discussion of data validation results; and
   - evaluation of groundwater quality.
3. Summary of water level data:
   - water level data summary tables; and
   - potentiometric maps.

Groundwater level data will be tabulated and used to generate groundwater potentiometric contour maps of the Site. Tables will summarize the validated analytical results, including the constituents analyzed, concentrations detected, qualifiers added during validation, detection limits, sample location, and date of sampling. The annual report will also include a brief narrative description of the conclusions of the groundwater sampling event and any recommendations that may be appropriate for future activities.

3.9 Health And Safety

The groundwater monitoring plan will be conducted in accordance with the procedures contained in the site-specific Health and Safety Plan for the NL Industries/ Taracorp Superfund Site (ARCADIS Geraghty & Miller 1999).

4.0 Contingency Plan

The groundwater data collected during the implementation of this plan will be used to evaluate the effectiveness of the recently installed cover system at the former Taracorp pile in reducing the concentrations of metals that have been detected in groundwater at the Site. The results of the pre-design groundwater investigation have verified that, although concentrations of lead above the action level of 0.015 mg/L were detected in a few on-site monitoring wells at the Main Industrial Site, lead has not migrated offsite. Total lead concentrations in the newly installed downgradient perimeter wells (i.e., GMMW-115S, D; GMMW-116S, D and GMMW-124S, D) were below analytical detection limits.

In addition, for all of the samples where the low flow, unfiltered data exceeded the action level for lead, all of the results from the same on-site monitoring wells collected by low-flow filtered techniques showed lead concentrations that were below analytical detection limits. These results confirmed that the lead is not mobile, even if it is present at low concentrations at certain on-site locations in a suspended form.

The effect of the newly installed cap at the former Taracorp pile should virtually eliminate infiltration to the groundwater system, thus preventing any additional constituent mass from source materials from reaching groundwater. Without additional contributions, the existing mass in the groundwater system should attenuate, and the metal concentrations in groundwater should continue to decline through natural attenuation processes.

However, in accordance with the requirements of the Preliminary Close-Out Report for the Site (U.S. EPA 2000a), the following steps will be followed in the event that concentrations of lead, cadmium or zinc in unfiltered samples exceed the action levels of 0.015 mg/L, 0.005 mg/L, and 5.0 mg/L, respectively, in downgradient perimeter wells.

check PCOR - Venice + Eagle Park?

1. Monitoring Wells MW-107 (S, D), MW-104 and GMMW-109 (S, D, X) will be designated as the downgradient perimeter monitoring wells under the contingency plan.

2. If concentrations of lead, cadmium, or zinc detected in the low-flow unfiltered groundwater samples from any of the downgradient perimeter wells exceed the respective action levels for these constituents, the well(s) will immediately be redeveloped and re-sampled for both total (i.e., low-

flow filtered samples) and dissolved concentrations (i.e., low-flow filtered samples).

3. If the results of the resampling indicate that dissolved lead, cadmium, and zinc concentrations in the well(s) exceed the action level(s), groundwater samples for total and dissolved lead, cadmium, and zinc will be collected from the well(s) on a quarterly basis for the next four (4) quarters.

4. The Taracorp pile will be inspected to determine if there is any evidence of erosion channels or areas of subsidence that may have compromised the integrity of the cap. Any observed damage will be repaired.

5. If the results of quarterly groundwater monitoring indicate that the exceedance of action levels is persistent, evaluation of a contingent remedy will be initiated. An exceedance would be considered persistent if the action level was exceeded in the low-flow filtered samples collected from the well(s) during two or more of the four quarterly sampling events.

6. In the event of a persistent exceedance of an action level(s), an evaluation of potential methods to enhance the natural attenuation processes for groundwater at the Site will be performed. The evaluation will include an assessment of the role of sorption and redox mechanisms on the mobility of the constituent(s) of concern. A report that summarizes the results of the evaluation would be submitted to the U.S. EPA within 60-days following determination that an action level(s) has been exceeded. The report, which would be reviewed and approved/modified by the U.S. EPA, would include recommendations for the collection of any additional site characterization data or analysis necessary to implement enhancements of the active natural attenuation processes at the Site, a schedule and procedures for evaluation of the effectiveness of the enhancements, and designation of and schedule for the design and implementation of a containment remedy for the Site, if the enhancements do not remedy the exceedances.

5.0 References

ARCADIS Geraghty & Miller, Inc. 1999. Pre-Design Investigation Work Plan for Groundwater, NL Industries/Taracorp Superfund Site, Granite City, Illinois, August 1999.

ARCADIS Geraghty & Miller, Inc. 2000. Pre-Design Investigation Report, NL Industries/Taracorp Superfund Site, Granite City, Illinois, September 2000.

O'Brien & Gere Engineers, Inc. 1998. Remedial Investigation Report, Granite City Site, Granite City, Illinois, September 1998.

U.S. Environmental Protection Agency. 2000. Explanation of Significant Differences for the NL Industries Site, Granite City, Illinois, September 2000.

U.S. EPA. 2000a. Preliminary Close-Out Report, NL/Taracorp, Granite City, Illinois, National Priorities List Superfund Site, September 2000.

TABLES

Table 1. Groundwater Monitoring Well Network, Groundwater Monitoring Plan
NL Industries/Taracorp Site, Granite City, Illinois.

Well Identification	Well Diameter (inches)	Well Depth (ft bls)	Screen Material/ Construction	Screen Length (ft)	Screen Interval (ft bls)	Top of Casing Elevation	Ground Elevation (ft msl)
MW-101	2.0	25.0	Type A	10.0	15.0-25.0	NA	NA
MW-102	2.0	25.0	Type A	10.0	15.0-25.0	NA	NA
GMMW-103R	2.0	23.0	Type B	10.0	13.0-23.0	NA	NA
MW-104	2.0	27.0	Type A	10.0	17.0-27.0	NA	NA
MW-105S	2.0	26.0	Type A	5.0	21.0-26.0	NA	NA
MW-105D	2.0	35.3	Type A	5.0	30.3-35.3	NA	NA
MW-106S	2.0	20.79	Type A	5.0	15.79-20.79	NA	NA
MW-106D	2.0	34.91	Type A	5.0	29.91-34.91	NA	NA
MW-107S	2.0	22.46	Type A	5.0	17.46-22.46	NA	NA
MW-107D	2.0	35.44	Type A	5.0	30.44-35.44	NA	NA
GMMW-108S	2.0	29.0	Type B	10.0	19.0-29.0	NA	NA
MW-108D	2.0	32.26	Type A	5.0	27.26-32.26	NA	NA
GMMW-108X	2.0	50.0	Type B	10.0	40.0-50.0	NA	NA
GMMW-109S	2.0	24.0	Type B	10.0	14.0-24.0	NA	NA
GMMW-109D	2.0	36.5	Type B	10.0	26.5-36.5	NA	NA
GMMW-109X	2.0	50.0	Type B	10.0	40.0-50.0	NA	NA
GMMW-112S	2.0	21.0	Type B	10.0	11.0-21.0	NA	NA
GMMW-112D	2.0	37.5	Type B	10.0	27.5-37.5	NA	NA
GMMW-113S	2.0	22.0	Type B	10.0	12.0-22.0	NA	NA
GMMW-113D	2.0	37.5	Type B	10.0	27.5-37.5	NA	NA
GMMW-115S	2.0	28.0	Type B	10.0	18.0-28.0	NA	NA
GMMW-115D	2.0	41.0	Type B	10.0	31.0-41.0	NA	NA
GMMW-116S	2.0	31.0	Type B	10.0	21.0-31.0	NA	NA
GMMW-116D	2.0	44.0	Type B	10.0	34.0-44.0	NA	NA
GMMW-117	2.0	24.0	Type B	10.0	14.0-24.0	NA	NA
GMMW-118	2.0	34.0	Type B	10.0	24.0-34.0	NA	NA
GMMW-119	2.0	22.0	Type B	10.0	12.0-22.0	NA	NA
GMMW-120	2.0	21.0	Type B	10.0	11.0-21.0	NA	NA
GMMW-121	2.0	20.0	Type B	10.0	10.0-20.0	NA	NA
GMMW-122	2.0	21.0	Type B	10.0	11.0-21.0	NA	NA
GMMW-123	2.0	22.0	Type B	10.0	12.0-22.0	NA	NA
GMMW-124S	2.0	27.0	Type B	10.0	17.0-27.0	NA	NA
GMMW-124D	2.0	40.0	Type B	10.0	30.0-40.0	NA	NA
GMMW-125	2.0	29.0	Type B	10.0	19.0-29.0	NA	NA
GMMW-126	2.0	26.0	Type B	10.0	16.0-26.0	NA	NA

Notes:
All screen material is Polyvinyl chloride (PVC).
Type A screen material is Schedule 40 PVC with 0.010 inch slot size.
Type B screen material is Vee-Pak (pre-sand packed) Schedule 40 PVC with 0.008 inch slot size.
ft feet
bls below land surface
msl mean sea level
NA Not Available

Table 2. Summary of Well Construction Details, Groundwater Monitoring Plan
NL Industries/Taracorp Site, Granite City, Illinois.

Well Construction Items	Main Industrial Site			Remote Fill Areas
Type	Shallow (S)	Intermediate (D)	Deep (X)	Shallow
Purpose	Further definition of groundwater quality at main area			Characterize groundwater quality
Total Depth (ft below grade)	20-25	35 -45	50	20-25
Borehole Diameter (inches)	8.25	8.25	8.25	8.25
Casing	2-inch diameter Schedule 40 PVC			2-inch diameter Schedule 40 PVC
Screen	Vee-Pack PVC pre-packed screen, with 2-inch inner diameter, 4-inch outer diameter 0.008 slot screen (10 feet in length)			Vee-Pack PVC pre-packed screen, with 2-inch inner diameter, 4-inch outer diameter 0.008 slot screen (10 feet in length)
Sand Pack	Uniformly graded silica sand extending 1 to 1.5 feet above top of Vee-Pack screen			Uniformly graded silica sand extending 1 to 1.5 feet above top of Vee-Pack screen
Seal	Bentonite 2 to 3 ft above sand pack			Bentonite 2 to 3 ft above sand pack
Grout	Bentonite/cement slurry to 1 ft bgs			Bentonite/cement slurry to 1 ft bgs
Surface Casing	4-inch diameter steel protective locking cover, 2.5 to 3 ft above grade/ or 8-inch diameter steel flush mounted type well cover			8-inch diameter steel flush mounted type well cover

ft bgs Feet below ground surface.
PVC Polyvinyl chloride.

Table 3. Laboratory Methods and Detection Limits for Cadmium, Lead, and Zinc, NL Industries/Taracorp Superfund Site, Granite City, Illinois.

TAL Metals	Method Number (SW-846)	Method Detection Limit
Groundwater		(ug/L)
Cadmium	6010	0.71
Lead	6010	1.5
Zinc	6010	5.9

ug/L Micrograms per liter

G:\APROJECT\NLIndustries\groundwater monitoring plan\[table 3 and 4 QAPPTBL.xls]table 4

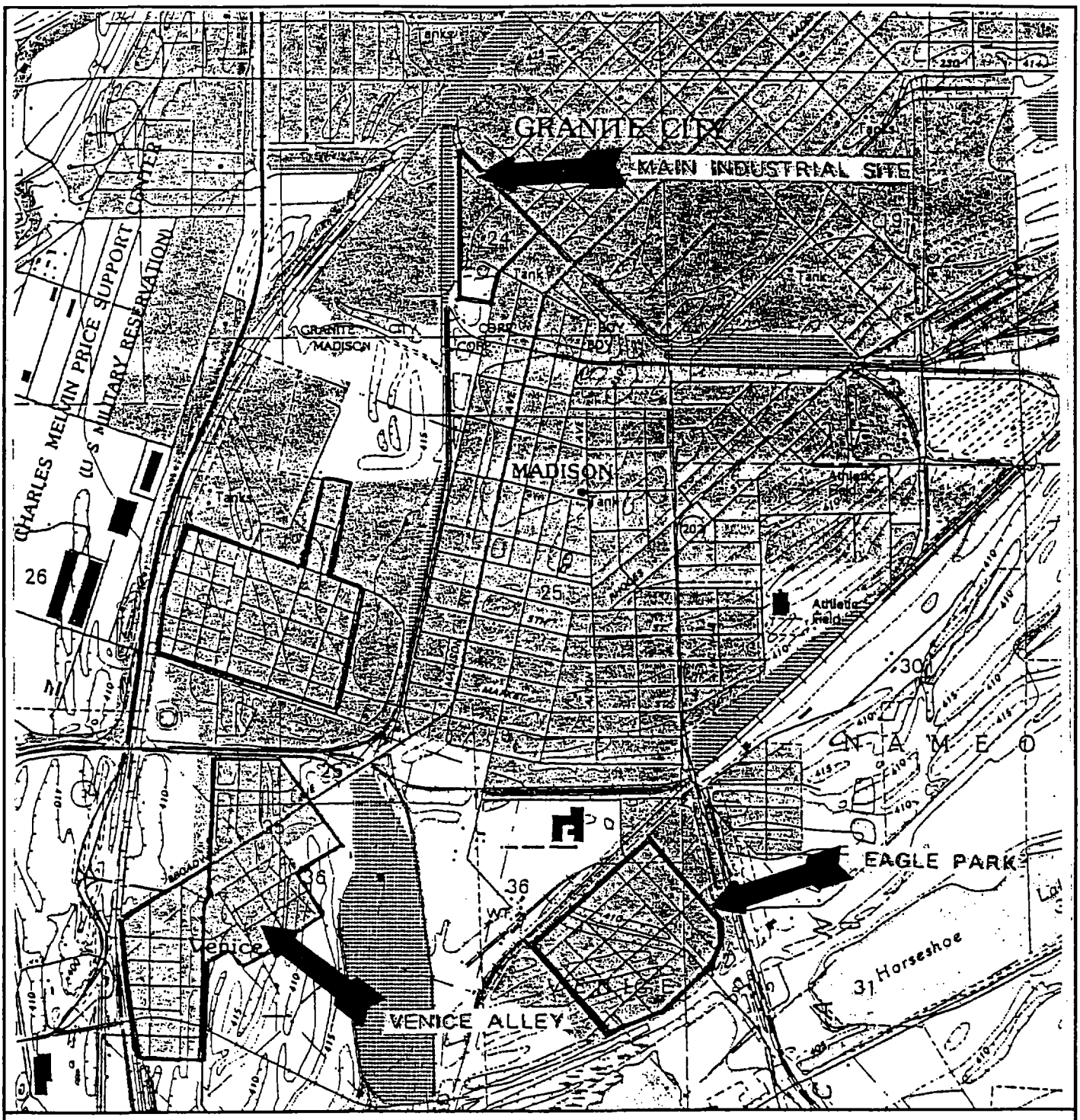
Table 4. Summary of Sampling and Analysis Program, Groundwater Monitoring Plan
NL Industries/Taracorp Site, Granite City, Illinois.

Location	Parameter	Number of Samples: Unfiltered (low-flow)	Number of Samples: QA/QC Samples	Analytical Method	Sample Containers (a)	Preservative	Holding Times (b)
Main Industrial Site	***Laboratory Analysis***						
	Cadmium, Lead, and Zinc	29	1	6010	500 mL P	2 mL 1:1 nitric acid	6 months
	Field Analyses						
	Redox			--	--	--	immediate
	pH			--	--	--	immediate
	Temperature			--	--	--	immediate
	Conductivity			--	--	--	immediate
Remote Fill Areas	***Laboratory Analysis***						
	Lead	6	1	6010	500 mL P	2 mL 1:1 nitric acid	6 months
	Field Analyses						
	Redox			--	--	--	immediate
	pH			--	--	--	immediate
	Temperature			--	--	--	immediate
	Conductivity			--	--	--	immediate
	Turbidity						

Notes:
(a) Sample containers will be of demonstrated cleanliness as described in the laboratory QAPP.
(b) Holding time starts from time of sample collection.
(c) QA/QC samples include 1 field blank and 1 field duplicate for every twenty (20) samples, per matrix

mL milliliters
P = Polyethylene

FIGURES



SOURCE: USGS 7.5 MIN. TOPOGRAPHIC MAP, GRANITE CITY, ILLINOIS/MISSOURI QUADRANGLES, 1954, PHOTOREVISED 1993.

Date: 12/07/00 Project No.: CI001003.0005 Filename: 00CI0531.DWG Drwn By/Plot Scale: NEK/1=1

ARCADIS GERAGHTY & MILLER

35 East Wacker Drive
Suite 1000, Chicago, Illinois 60601
Tel: 312/263-6703 Fax: 312/263-7887

SITE LOCATION MAP
GROUNDWATER MONITORING PLAN
NL INDUSTRIES/TARACORP
SUPERFUND SITE
GRANITE CITY, ILLINOIS

PROJECT NUMBER
CI1003.005

FIGURE NUMBER
1

Date: 12/07/00 Project No.: CI001003.0005 Filename: 00CI0530.DWG Drwn By/Plot Scale: NEK/1=200

SEE FIGURE 4 FOR LOCATION
OF MONITORING WELL GMMW 126

SEE FIGURE 3 FOR LOCATION
OF MONITORING WELL GMMW 125

MW 105S
MW 105D
MW 106S
MW 106D
GMMW 116S
GMMW 116D
Metallico
16TH STREET
MW 107S
MW 107D
MW 101
0 200
Scale In Feet
CLOSED TARACORP PILE
MW 104
GMMW 108S
GMMW 108D
GMMW 108X
BV&G Trucking
GMMW 115S
GMMW 115D
State Street Warehouse & Transfer
Rich Oil
STATE STREET
MW 102
GMMW 112S
GMMW 112D
GMMW 113S
GMMW 113D
GMMW 109S
GMMW 109D
GMMW 109X
GMMW 103R
GMMW 124S
GMMW 124D

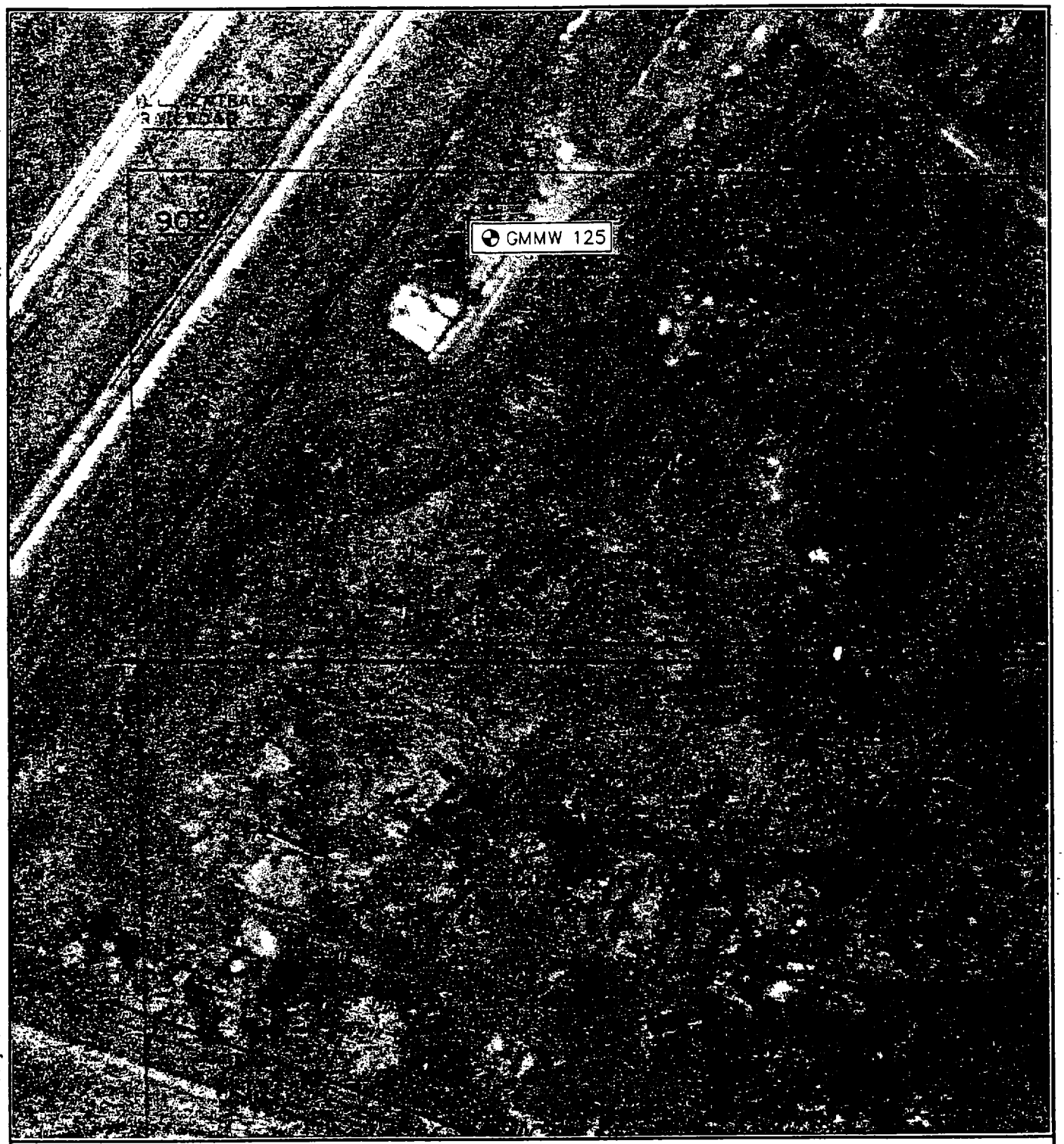
LEGEND

MW101	◔	EXISTING MONITORING WELL/IDENTIFICATION
	———	PROPERTY LINE
GMMW 112S,D	◆	MONITORING WELL CLUSTER/IDENTIFICATION (Shallow and Deep depths)
GMMW 109X	◆	DEEPER MONITORING WELL/IDENTIFICATION
GMMW 103R	●	REPLACEMENT MONITORING WELL/IDENTIFICATION
	S	SHALLOW (12–34 FEET BELOW LAND SURFACE)
	D	DEEP (27–44 FEET BELOW LAND SURFACE)
	X	DEEPER (40–50 FEET BELOW LAND SURFACE)

Source: Woodward–Clyde Consultants, Figure No.1, November 11, 1993, Proj. no. C3M11Q.

ARCADIS GERAGHTY & MILLER
35 East Wacker Drive
Suite 1000, Chicago, Illinois 60601
Tel: 312/263-6763 Fax: 312/263-7887

DRAWN NEK	DATE December 7, 2000	PROJECT MANAGER J KRATZMEYER	DEPARTMENT MANAGER J KRATZMEYER
		LEAD DESIGN PROF. N Kamala	CHECKED A TOKARSKI
MAIN INDUSTRIAL SITE MONITORING WELL LOCATIONS GROUNDWATER MONITORING PLAN NL INDUSTRIES/TARACORP SUPERFUND SITE GRANITE CITY, ILLINOIS		PROJECT NUMBER CI001003.0005	FIGURE NUMBER 2



Date: 12/07/00 Project No.: CI001003.0005 Filename: 00CI0527.DWG Drwn By/Plot Scale: NEK/STF

0 100

LEGEND

GMMW 125 MONITORING WELL LOCATION/IDENTIFICATION

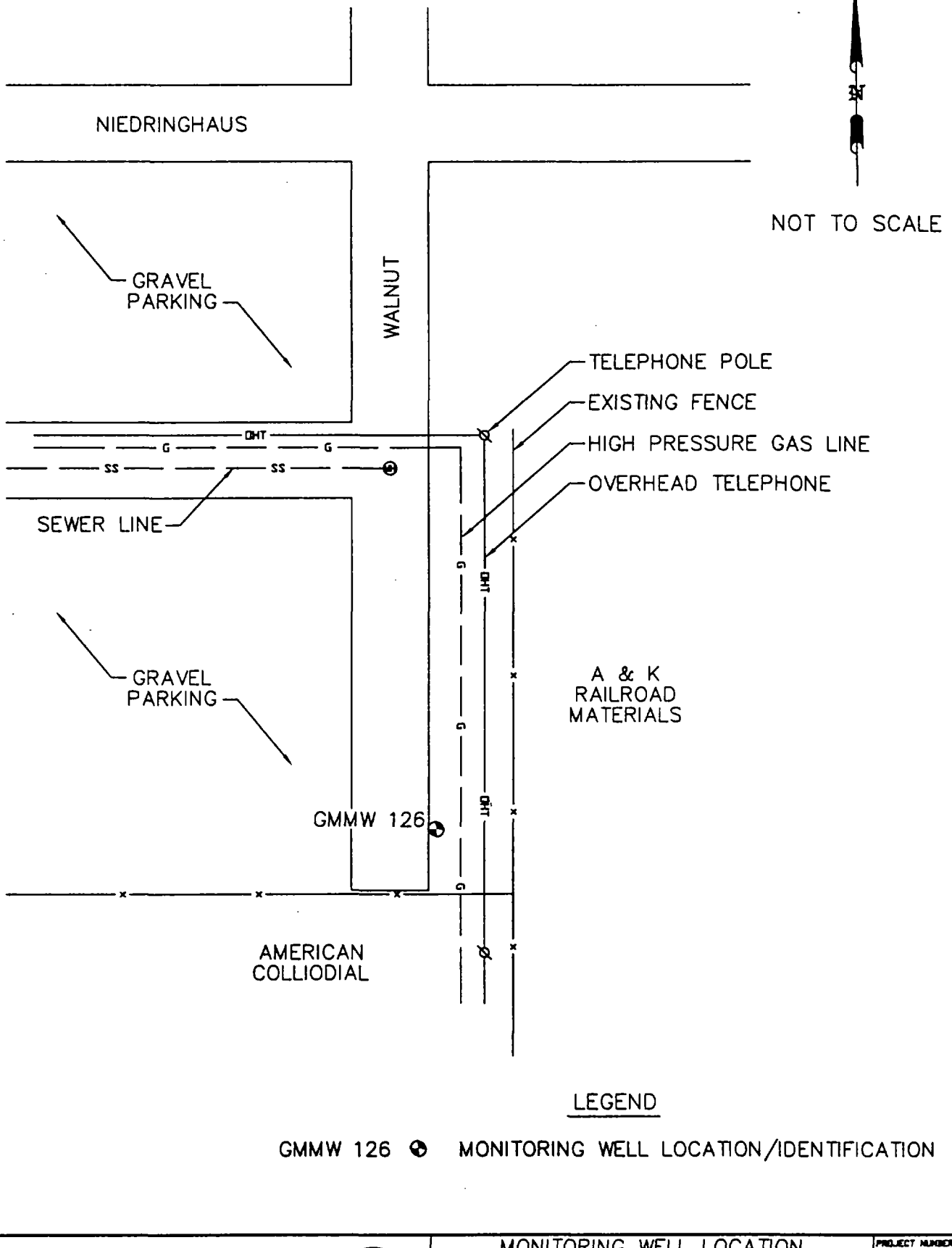
ARCADIS GERAGHTY & MILLER

35 East Wacker Drive
Suite 1000, Chicago, Illinois 60601
Tel: 312/263-4700 Fax: 312/263-7887

MAIN INDUSTRIAL SITE
MONITORING WELL LOCATION GMMW 125
GRANITE CITY STEEL
NL INDUSTRIES/TARACORP SUPERFUND SITE
GRANITE CITY, ILLINOIS

PROJECT NUMBER: CI1003.005

FIGURE NUMBER: 3



Date: 12/07/00 Project No.: CI001003.0005 Filename: 00CI0528.DWG Drwn By/Plot Scale: NEK/1=2

ARCADIS GERAGHTY & MILLER

35 East Wacker Drive
Suite 1000, Chicago, Illinois 60601
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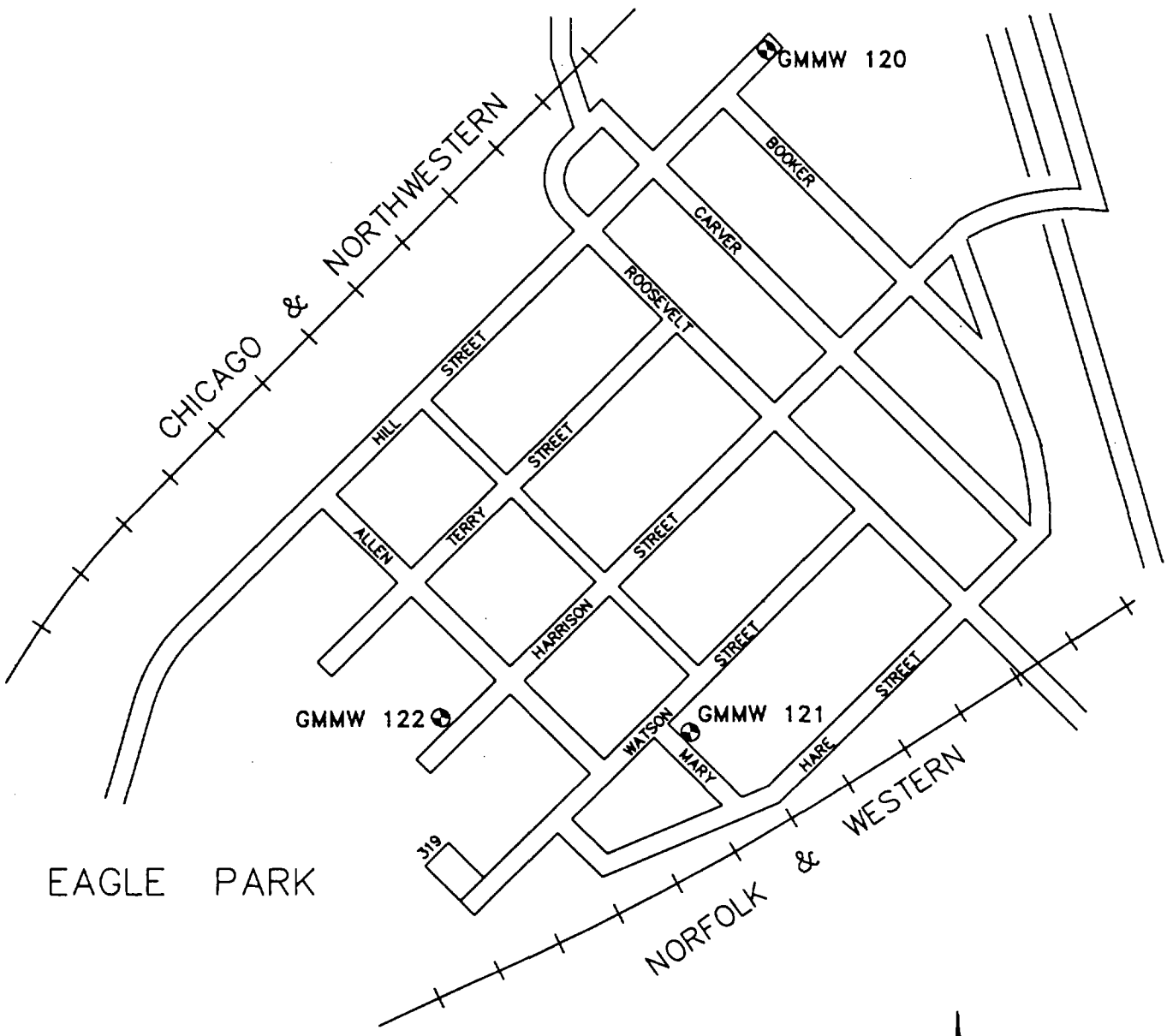
MONITORING WELL LOCATION
GRANITE CITY RIGHT-OF-WAY
GROUNDWATER MONITORING PLAN
NL INDUSTRIES/TARACORP SUPERFUND SITE
GRANITE CITY, ILLINOIS

PROJECT NUMBER
CI1003.05

FIGURE NUMBER
4

Date: 12/07/00 Project No.: CI001003.0005 Filename: 00CI0526.DWG Drwn By/Plot Scale: NEK/1=500



LEGEND

GMMW 120 ⊕ SHALLOW MONITORING WELL/IDENTIFICATION

N

0 500

Scale In Feet

Basemap Source: Woodward-Clyde Consultants, Figure 1-6, June 1, 1994, Proj. No. C3M11Q.

ARCADIS GERAGHTY & MILLER

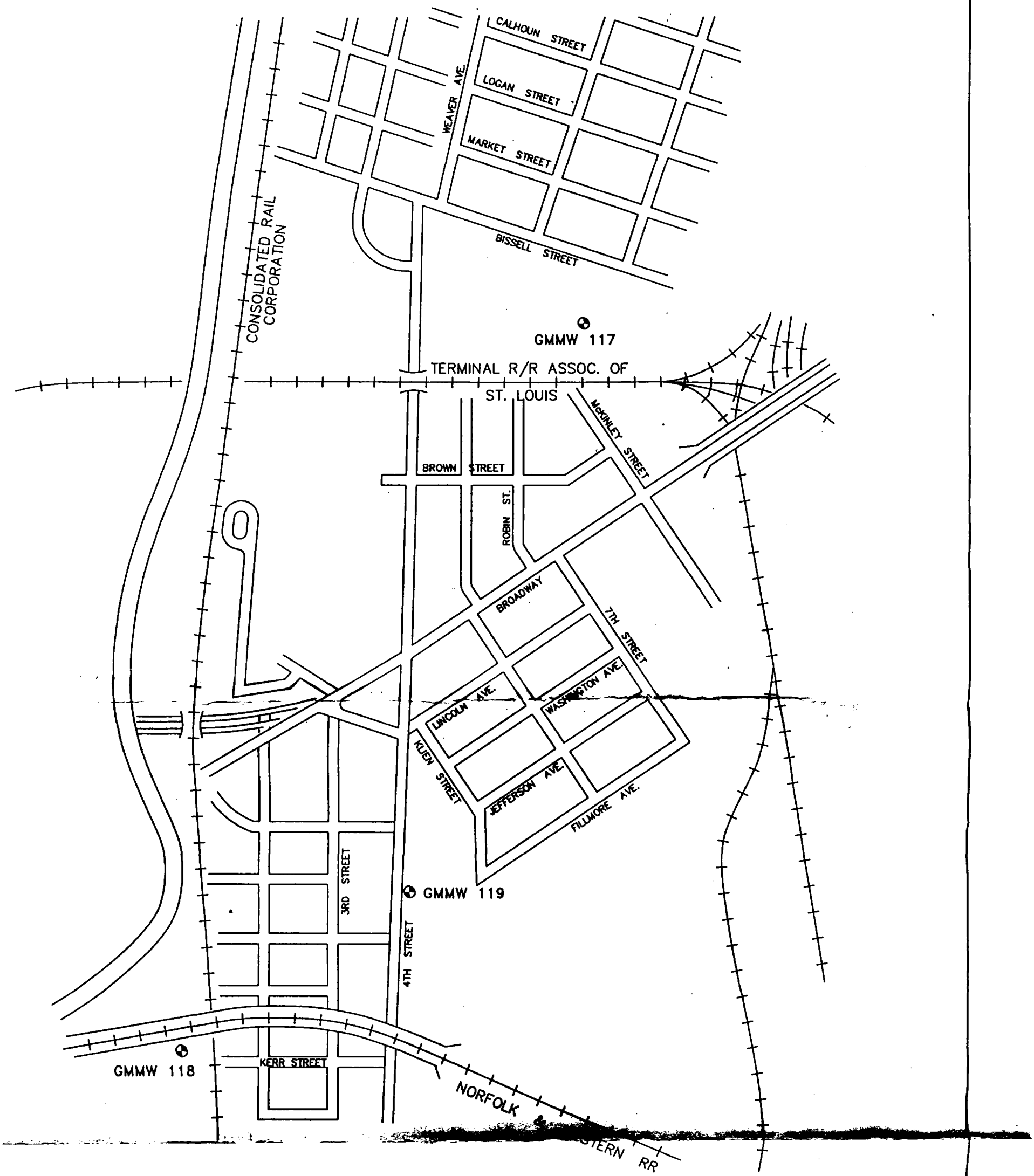
35 East Wacker Drive
Suite 1000, Chicago, Illinois 60601
Tel: 312/263-6703 Fax: 312/263-7887

EAGLE PARK ACRES
NEW MONITORING WELL LOCATIONS
GROUNDWATER MONITORING PLAN
NL INDUSTRIES/TARACORP SUPERFUND SITE
GRANITE CITY, ILLINOIS

PROJECT NUMBER: CI1003.005

FIGURE NUMBER: 5

Date: 12/07/00 Project No.: CI001003.0005 Filename: 00CI0525.DWG Drwn By/Plot Scale: NEK/1=600



LEGEND

GMMW 117 ⊕ SHALLOW MONITORING WELL/IDENTIFICATION

0 600

Scale In Feet

Basemap Source: Woodward-Clyde Consultants, Figure No. 1-7, February 14, 1994, Proj. No. C3M11Q.

ARCADIS GERAGHTY & MILLER

35 East Wacker Drive
Suite 1000, Chicago, Illinois 60601
Tel: 312/263-6703 Fax: 312/263-7887

DRAWN NEK	DATE December 7, 2000	PROJECT MANAGER J KRATZMEYER	DEPARTMENT MANAGER J KRATZMEYER
VENICE TOWNSHIP NEW MONITORING WELL LOCATIONS GROUNDWATER MONITORING PLAN NL INDUSTRIES/TARACORP SUPERFUND SITE GRANITE CITY, ILLINOIS		LEAD DESIGN PROF. N Kamada	CHECKED A TOKARSKI
		PROJECT NUMBER CI001003.0005	FIGURE NUMBER 6

Drwn By/Plot Scale: NEK/STF

Filename: 00C0529.DWG

Project No.: C1001003.0005

Date: 12/07/00

0 100

LEGEND

GMMW 123 MONITORING WELL LOCATION/IDENTIFICATION

ARCADIS GERAGHTY & MILLER

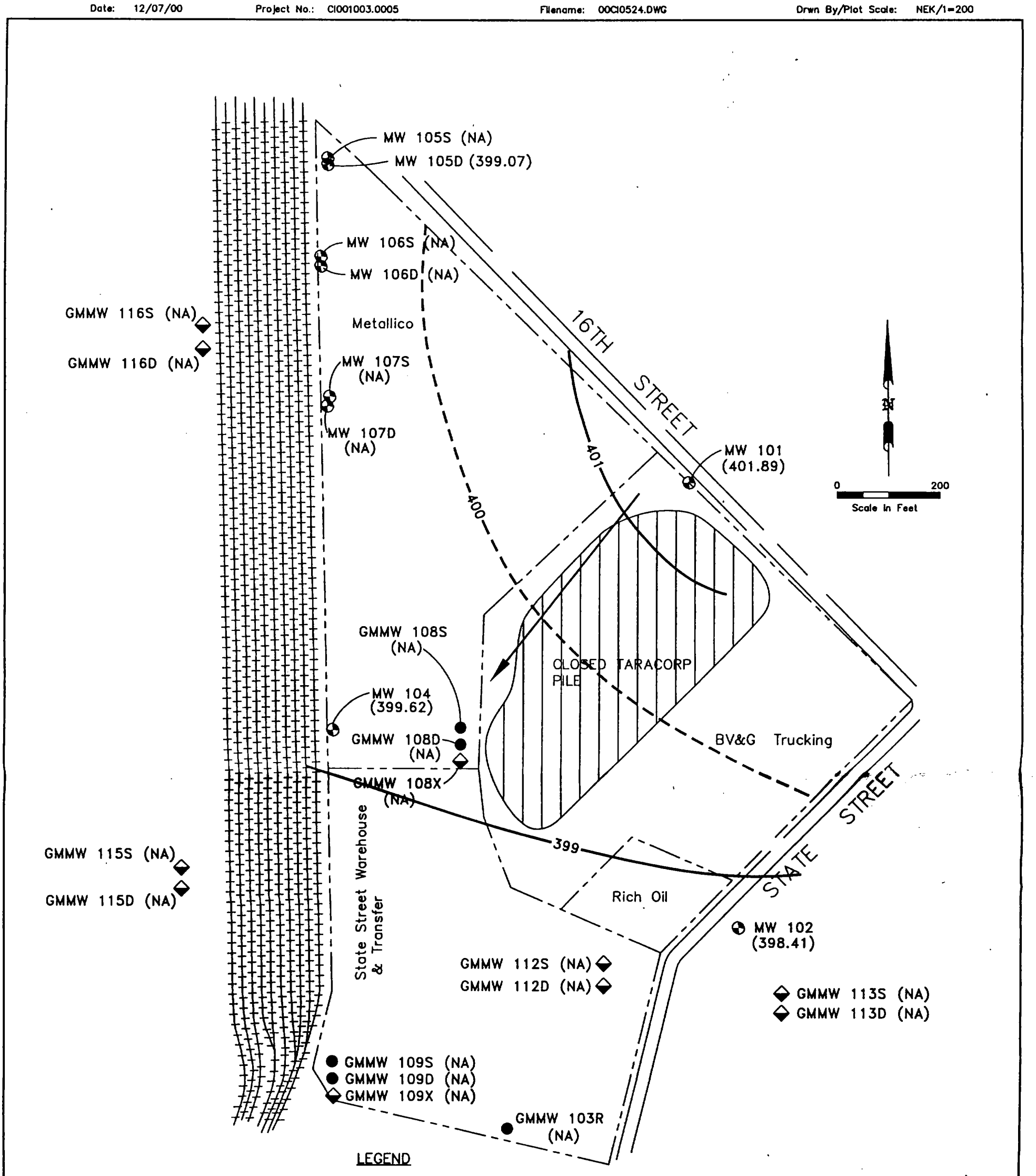
35 East Wacker Drive
Suite 1000, Chicago, Illinois 60601
Tel: 312/263-6703 Fax: 312/263-7887

MAIN INDUSTRIAL SITE
MONITORING WELL LOCATION GMMW 123
12TH STREET AND MADISON AVENUE
NL INDUSTRIES/TARACORP SUPERFUND SITE
GRANITE CITY, ILLINOIS

PROJECT NUMBER
C11003.005

FIGURE NUMBER
7

Date: 12/07/00 Project No.: CI001003.0005 Filename: 00CI0524.DWG Drwn By/Plot Scale: NEK/1=200



LEGEND

MW101	⊕	EXISTING MONITORING WELL/IDENTIFICATION
	———	PROPERTY LINE
GMMW 112S,D	◆	MONITORING WELL CLUSTER/IDENTIFICATION (Shallow and Deep depths)
GMMW 109X	◆	DEEPER MONITORING WELL/IDENTIFICATION
GMMW 103R	●	REPLACEMENT MONITORING WELL/IDENTIFICATION
	S	SHALLOW (12–34 FEET BELOW LAND SURFACE)
	D	DEEP (27–44 FEET BELOW LAND SURFACE)
	X	DEEPER (40–50 FEET BELOW LAND SURFACE)
	(398.41)	GROUNDWATER ELEVATION IN FEET
	NA	NOT AVAILABLE
	———	GROUNDWATER CONTOUR (DASHED WHERE INFERRED)
	←———	GROUNDWATER FLOW DIRECTION

GMMW. 124S (NA) ◆
◆ GMMW 124D (NA)

Source: Woodward–Clyde Consultants, Figure No.1, November 11, 1993, Proj. no. C3M11Q.

ARCADIS GERAGHTY & MILLER
36 East Stetler Drive
Suite 1000, Chicago, Illinois 60601
Tel: 312/263-6763 Fax: 312/263-7887

DRAWN NEK	DATE December 7, 2000	PROJECT MANAGER J KRATZMEYER	DEPARTMENT MANAGER J KRATZMEYER
MAIN INDUSTRIAL SITE GROUNDWATER ELEVATIONS AND CONTOUR MAP GROUNDWATER MONITORING PLAN NL INDUSTRIES/TARACORP SUPERFUND SITE GRANITE CITY, ILLINOIS		LEAD DESIGN PROF. N Kenesis	CHECKED A TOKARSKI
		PROJECT NUMBER CI001003.0005	FIGURE NUMBER 8

APPENDIX A

Explanation of Significant Difference

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION V

DATE:

SUBJECT: Request for Concurrence on the Explanation of Significant Differences for the NL Industries/Taracorp Site, Granite City, Illinois

FROM: Eric Cohen, Chief
Multimedia Branch II

James Mayka, Chief
Remedial Response Branch #1

TO: William E. Muno, Director
Superfund Division

The purpose of this memorandum is to convey our recommendation that you sign the attached Explanation of Significant Differences (ESD) for the NL Industries/Taracorp Site, which is located in Granite City, Illinois.

The ESD was prepared in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. Section 9601 et seq., as amended by the Superfund Amendments and Reauthorization Act of 1986, Public Law 99-499; to the extent practicable, the National Contingency Plan, 40 CFR Part 300; and Agency policy. We have reviewed the attached documents and have concluded that the ESD is both legally and technically sufficient. As such, we believe that implementation of this remedial measure is a proper exercise of your delegated authority.

Please feel free to contact either of us should you have any questions.

Attachment

cc: Thomas Skinner, Illinois EPA
Sandy Bron, Illinois EPA
Jeff Leed, Leed Environmental ✓

EXPLANATION OF SIGNIFICANT DIFFERENCES

for the

NL INDUSTRIES SITE
GRANITE CITY, ILLINOIS

INTRODUCTION

The purpose of this document for the NL Industries/Taracorp Superfund Site (NL Site or the Site) is to explain how remedial activities will differ from the remedial action selected by the U.S. Environmental Protection Agency (EPA) in the Record of Decision (ROD) signed on March 30, 1990 and the Decision Document/Explanation of Significant Differences (DD/ESD) signed on September 29, 1995.

Based on recent ground water data, it appears that lead does not migrate appreciably in the ground water after it is released from the Taracorp slag pile. The data indicate that lead travels less than 200 feet from its point of release at the Taracorp pile before presumably being immobilized by the soil.

Therefore, pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 117(c), 42 U.S.C. § 9617(c), and Section 300.435(c)(2)(I) of the National Contingency Plan (NCP), 40 C.F.R. § 300.435(c)(2)(I), U.S. EPA is publishing this Explanation of Significant Differences. As required by Section 300.825(a)(2) of the NCP, 40 C.F.R. § 300.825(a)(2), this ESD will become part of the NL Industries Administrative Record which is available for review at the Granite City City Hall, City Clerk's Office, 2000 Edison Ave., Granite City, Illinois and the U.S. EPA Records Center located at 77 West Jackson Boulevard, Chicago, Illinois. The information used in U.S. EPA's assessment, including the most recent ground water data, is currently available at the cited repository.

SUMMARY OF SITE HISTORY, CONTAMINATION, AND SELECTED REMEDY

The NL Site, located in Granite City, Madison (including Eagle Park Acres), and Venice, Illinois, is the location of a former secondary lead smelting facility (see Figure 1). Metal refining, fabricating, and associated activities have been conducted at the Site since the turn of the century. From 1903 to 1983 secondary lead smelting occurred on-site. Secondary lead smelting operations were discontinued during 1983 and the equipment dismantled. Taracorp Industries owned the Site from 1979 to 1997. Metalico, the current owner of the main industrial site, continues to perform metal refining at the facility.

The NL Site was listed on the National Priorities List, 40 C.F.R. Part 300 (NPL), on June 10, 1986. NL, as former owner of the site, voluntarily entered into an Agreement and Administrative Order by Consent with the EPA and Illinois EPA in May 1985 to implement a Remedial Investigation and Feasibility Study (RI/FS). The RI/FS was completed in January 1990.

The RI for the NL Site indicated the need to prevent ingestion and inhalation of lead-contaminated soils and waste materials in the Taracorp pile and the remainder of the main

industrial site, residential soils contaminated by lead fallout from the smelter stack, and battery case material used as fill material for alleys, driveways, and other areas. Additionally, the RI indicated the need for further ground water monitoring in the deeper zone of the upper aquifer and a mechanism for remediation of any contaminants in the ground water that are detected in concentrations that would present an endangerment to public health or the environment.

Different alternatives to address Site contamination were evaluated in the NL Feasibility Study and Addendum, which was authored by EPA. After a detailed analysis of the alternatives, EPA issued a Proposed Plan detailing EPA's proposed remedy. After taking into consideration all public comments, the Regional Administrator signed a Record of Decision (ROD) on March 30, 1990. The remedy specified in the ROD contained, among other things, a requirement for further ground water monitoring; at that time, ground water samples were being filtered through a 0.45 micron filter, and no levels of lead or other metals exceeded applicable standards.

Negotiations between EPA and potentially responsible parties (PRPs) at the NL Site to design and construct the Site remedy failed. EPA sued certain PRPs to compel them to perform the Site remedy and to collect penalties for their failure to do so. Starting in 1991, EPA performed the Remedial Design for the Site and about half of the Remedial Action. In July 1998, some of the generator defendants took over the Remedial Action and have finished nearly all of the cleanup activities at the Site.

During the Remedial Design for the NL Site, the sample extraction and preparation methods were changed to low flow sampling techniques with no filtering of metals prior to analysis. For metals, this method was and continues to be considered more applicable to what would actually be consumed in drinking water. Analytical results from 1992 and 1993 indicated that lead levels in the monitoring wells downgradient from the Taracorp pile exceeded the action level of 15 parts per billion (ppb). The monitoring system at the Site consisted only of perimeter wells; there were no monitoring wells more than 200 feet from the toe of the Taracorp pile, and all of the downgradient perimeter wells were located on contaminated material that was spread on the surface of the main industrial area.

In response to these new findings, EPA included a ground water remedy component in the September 29, 1995, Decision Document/Explanation of Significant Differences (DD/ESD). The DD/ESD stated:

> "U.S. EPA has chosen to contain the ground water contamination at the Site through pumping, treatment, and discharge to the local Publically-Owned Treatment Works... As part of the selected ground water remedy, further downgradient ground water monitoring will be needed to determine the extent of the ground water contamination plume...."

After the installation of additional monitoring wells in March and June 2000, data collected

indicate that the lead in ground water does not migrate more than 200 feet from the Taracorp pile (See Figures 1 through 6 for monitoring well locations). Elevated levels of lead were not detected in any of the newly-installed wells outside of the perimeter of the Taracorp pile. When the DD/ESD was written, EPA thought that there was a considerable plume of contaminated ground water emanating from the Taracorp pile. The pile consistently failed the TCLP test for lead. Based upon the new data, EPA now believes that there is a very limited plume of lead contamination; the lead appears to travel less than 200 feet before adhering to soil particles. The lead mobilization near the Taracorp pile is probably due to the fact that a battery breaking area existed on the north side of the pile. Acid released from the broken batteries may mobilize the lead in ground water; the lead becomes immobile again once the acid is buffered by mixing with ground water outside the battery breaking area. Additionally, highly lead-contaminated waste material on the main industrial site was consolidated with the Taracorp pile, and the Taracorp pile was provided with a RCRA subtitle C, multilayered cap in 1999. This consolidation and capping will divert precipitation away from the waste materials in the Taracorp pile and, thus, decrease the amount of lead leaching from the pile and other areas of the main industrial area in the future.

Collectively, the recent site information indicates that ground water contamination at the Site is very limited and will likely decrease even further in the future. Also, since the local residents are all on a municipal water supply and there are no private drinking wells in the vicinity of the Site, there is currently no health risk to any receptors posed by ground water at the Site. Thus, based on current information, there is not a legitimate reason to require the installation of a ground water containment system at the Site.

DESCRIPTION OF THE SIGNIFICANT DIFFERENCES

As discussed above, this ESD pertains only to the ground water remedy at the NL Industries/Taracorp Site. The 1995 DD/ESD required a containment system for what was thought to be a lead ground water plume originating at the Taracorp pile and main industrial area, based on perimeter monitoring. This ESD changes this provision of the DD/ESD to require only further monitoring of ground water at the NL Site, with a contingency plan to be developed to address the situation if, in the future, lead migrates outside of the perimeter wells at levels that exceed applicable standards.

THE BASIS FOR THIS ESD

The primary basis for this ESD is that recent ground water samples taken at the Site indicate that lead does not migrate more than 200 feet from the perimeter of the Taracorp pile. The lead likely adsorbs onto soil particles shortly after its release from the pile. Given this information, there is no basis to require a containment system for Site ground water. EPA anticipates that the concentration of lead in ground water in the perimeter wells will decrease

since the contaminated main industrial area soils were consolidated with the Taracorp pile and the pile was capped in 1999. The appropriate remedy for Site ground water is 1) to continue monitoring via the expanded monitoring well network at the site, and 2) develop a contingency plan to address any exceedances of ground water standards that may occur outside of the perimeter wells in the future.

SUPPORT AGENCY COMMENTS

The State of Illinois concurs with this Explanation of Significant Differences.

AFFIRMATION OF THE STATUTORY DETERMINATIONS

Based upon current ground water monitoring at the NL Industries Site, EPA has changed the remedy selected in the ROD and DD/ESD. EPA and Illinois EPA believe that the remedy remains protective of human health and the environment. The changes comply with federal and state requirements identified in the ROD and DD/ESD as applicable or relevant and appropriate to this remedial action. The revised remedy uses permanent solutions and alternate treatment technologies to the maximum extent practicable for the NL Industries Site and is cost effective.

Concur _____ 9/19/00

William E. Muno
Superfund Division Director
Date

Not Concur _____

William E. Muno
Superfund Division Director
Date

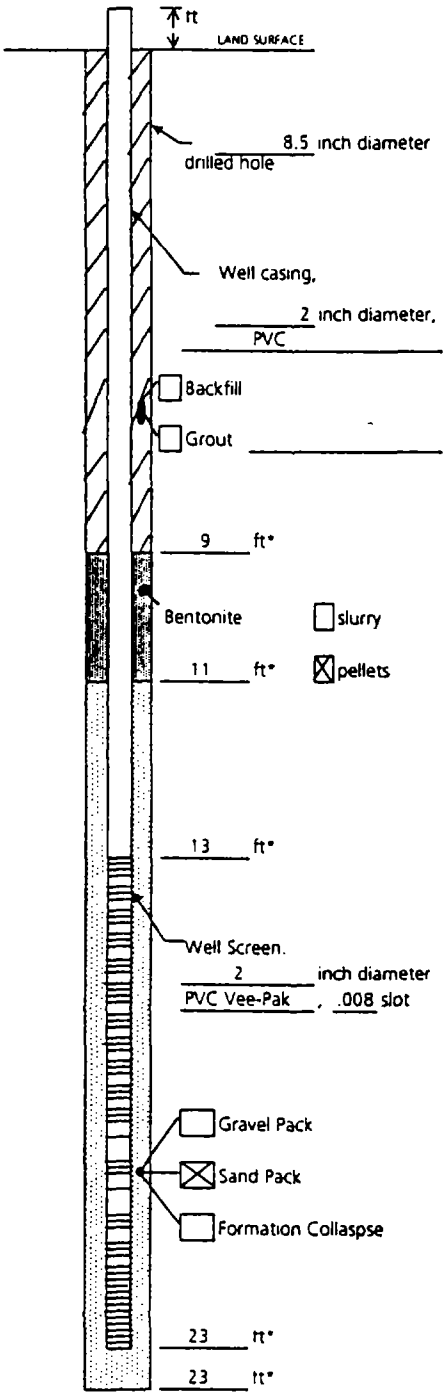
APPENDIX B

Well Construction Diagrams

ARCADIS GERAGHTY & MILLER

Well Construction Log

(Unconsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project NL Industries/Taracorp Superfund Site

Project # CI001003.0003 Well GMMW-103R

Town/City Granite City

County Madison State Illinois

Permit No.

Land-Surface Elevation and Datum:

_____ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 3/3/00

Drilling Method Hollow Stem Augres 4.25" diameter

Drilling Contractor Phillip Services Corporation

Drilling Fluid None

Development Technique(s) and Date(s)

3/8/00, Surge block, 75 gallons, purged with submersible pump.

Fluid Loss During Drilling _____ gallons

Water Removed During Development 75 gallons

Static Depth to Water 18.7 feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

Well Purpose Monitoring

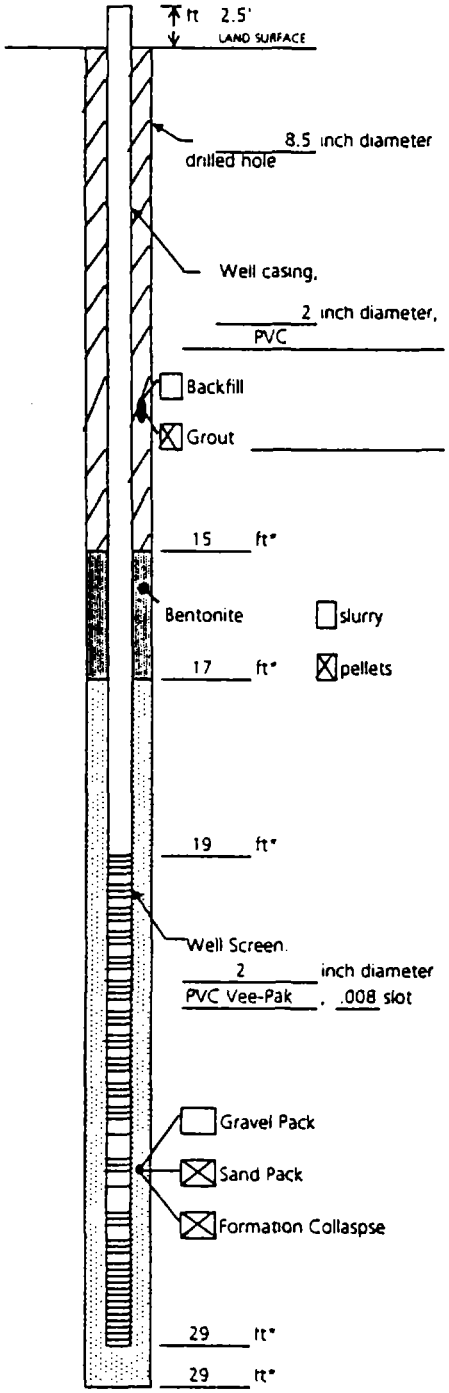
Remarks

Prepared by Adam Tokarski

ARCADIS GERAGHTY & MILLER

Well Construction Log

(Unconsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project NL Industries/Taracorp Superfund Site

Project # C1001003.0003 Well GMMW-108S

Town/City Granite City

County Madison State Illinois

Permit No.

Land-Surface Elevation and Datum:

_____ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 3/7/00

Drilling Method Hollow Stem Augres 4 25" diameter

Drilling Contractor Phillip Services Corporation

Drilling Fluid None

Development Technique(s) and Date(s)

3/16/00, Surge block and purged with bailer.

Fluid Loss During Drilling _____ gallons

Water Removed During Development 10 gallons

Static Depth to Water 23.75 feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

Well Purpose Monitoring

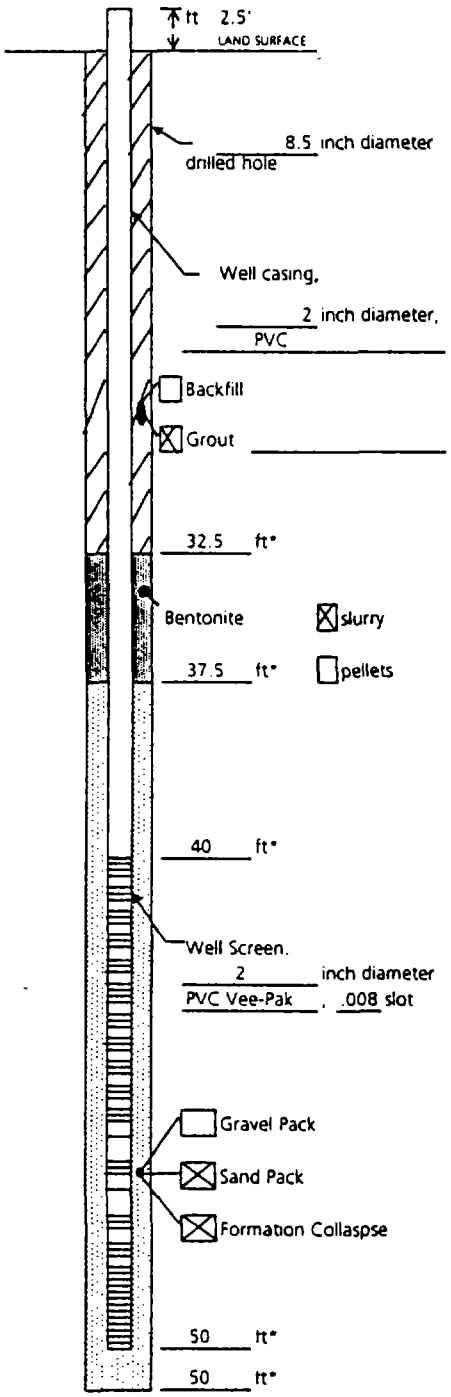
Remarks

Prepared by Adam Tokarski

ARCADIS GERAGHTY & MILLER

Well Construction Log

(Unconsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project NL Industries/Taracorp Superfund Site

Project # CI001003.0003 Well GMMW-108X

Town/City Granite City

County Madison State Illinois

Permit No.

Land-Surface Elevation and Datum:

_____ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 3/7/00

Drilling Method Hollow Stem Augres 4.25" diameter

Drilling Contractor Phillip Services Corporation

Drilling Fluid None

Development Technique(s) and Date(s)

3/16/00, Surge block and Grundfos pump. 200 gallons removed.

Fluid Loss During Drilling _____ gallons

Water Removed During Development 200 gallons

Static Depth to Water 24.32 feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

Well Purpose Monitoring

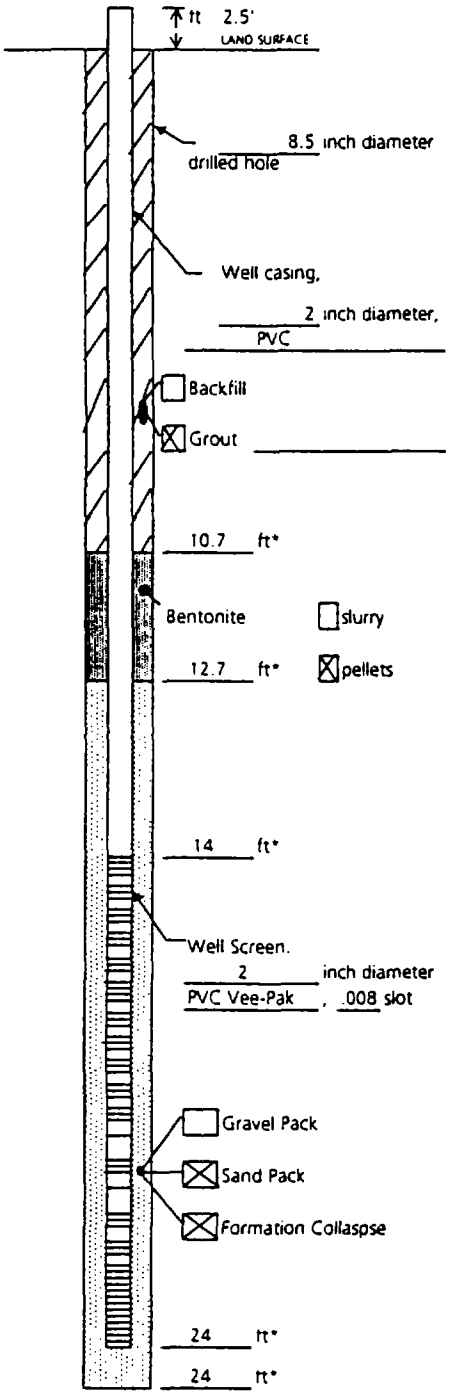
Remarks

Prepared by Adam Tokarski

ARCADIS GERAGHTY & MILLER

Well Construction Log

(Unconsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project NL Industries/Taracorp Superfund Site

Project # CI001003.0003 Well GMMW-109S

Town/City Granite City

County Madison State Illinois

Permit No.

Land-Surface Elevation and Datum:

_____ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 3/3/00

Drilling Method Hollow Stem Augres 4.25" diameter

Drilling Contractor Phillip Services Corporation

Drilling Fluid None

Development Technique(s) and Date(s)

3/8/00, Surge with bailer and pump with submersible pump. Removed 65 gallons.

Fluid Loss During Drilling _____ gallons

Water Removed During Development 65 gallons

Static Depth to Water 20.13 feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

Well Purpose Monitoring

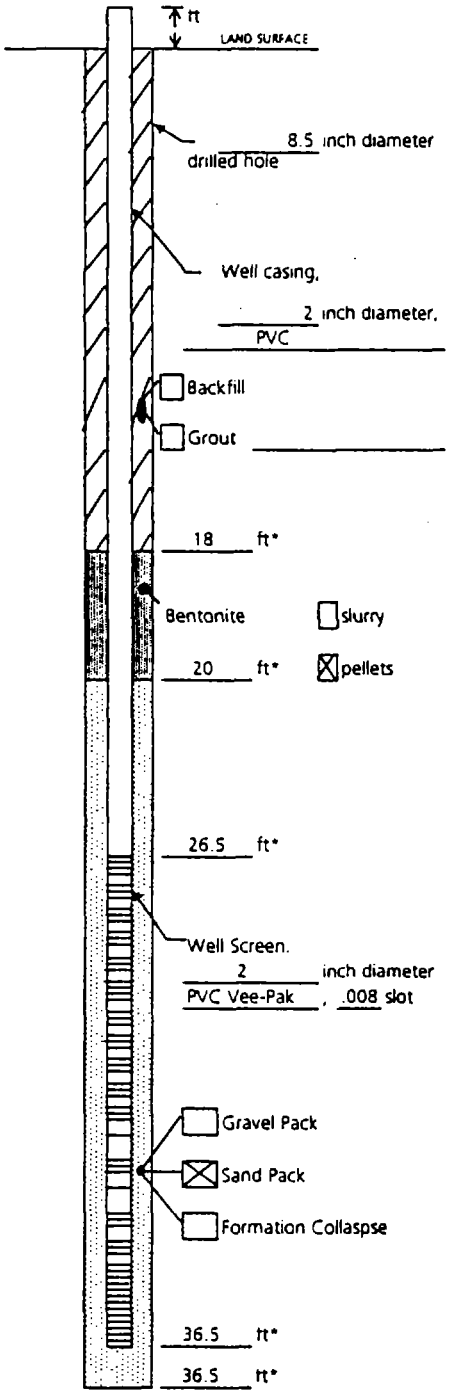
Remarks

Prepared by Adam Tokarski

ARCADIS GERAGHTY & MILLER

Well Construction Log

(Unconsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project NL Industries/Taracorp Superfund Site

Project # CI001003.0003 Well GMMW-109D

Town/City Granite City

County Madison State Illinois

Permit No.

Land-Surface Elevation and Datum:

_____ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 3/4/00

Drilling Method Hollow Stem Augres 4.25" diameter

Drilling Contractor Phillip Services Corporation

Drilling Fluid None

Development Technique(s) and Date(s)

3/8/00, Surge with bailer and purge with submersible pump. Removed 170 gallons.

Fluid Loss During Drilling _____ gallons

Water Removed During Development 170 gallons

Static Depth to Water 17.5 feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

Well Purpose Monitoring

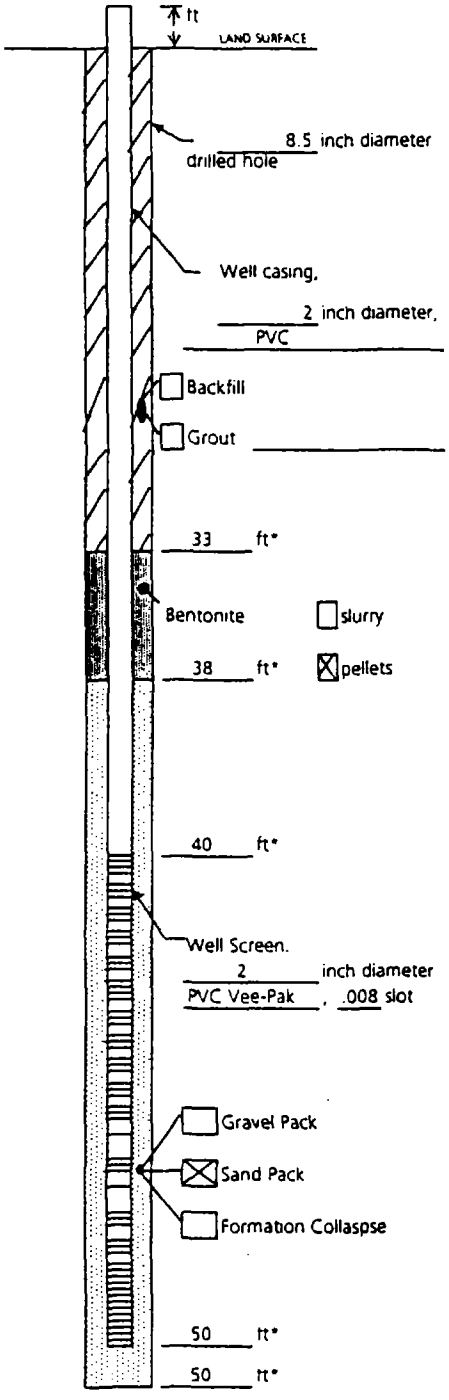
Remarks

Prepared by Adam Tokarski

ARCADIS GERAGHTY & MILLER

Well Construction Log

(Unconsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project NL Industries/Taracorp Superfund Site

Project # C1001003.0003 Well GMMW-109X

Town/City Granite City

County Madison State Illinois

Permit No.

Land-Surface Elevation and Datum:

_____ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 3/4/00

Drilling Method Hollow Stem Augres 4.25" diameter

Drilling Contractor Phillip Services Corporation

Drilling Fluid None

Development Technique(s) and Date(s)

3/16/00, Surge block, bailer and submersible pump.

Fluid Loss During Drilling _____ gallons

Water Removed During Development 350 gallons

Static Depth to Water 17.5 feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

Well Purpose Monitoring

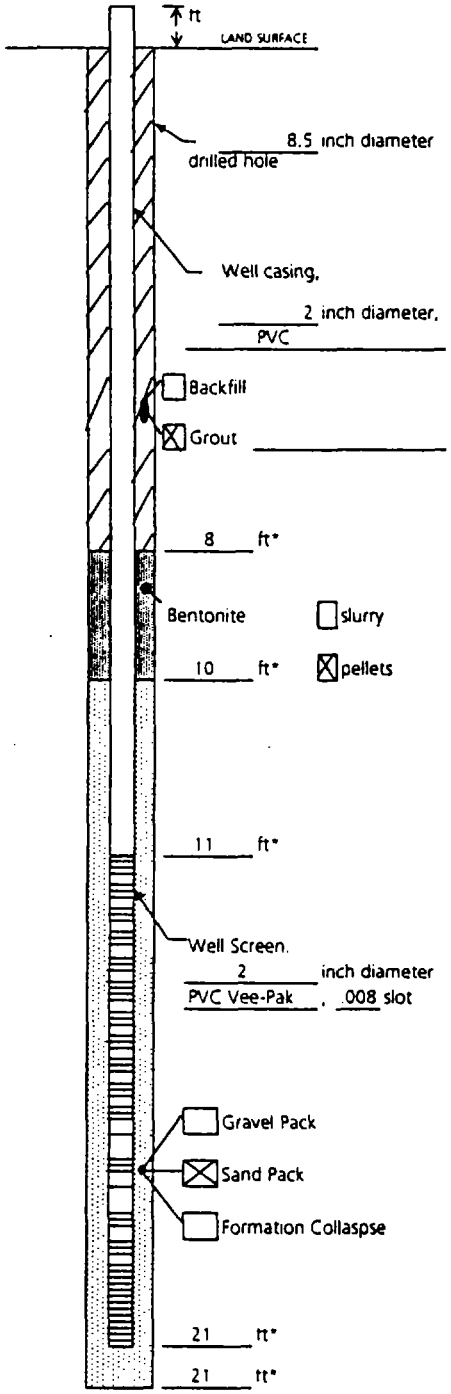
Remarks

Prepared by Adam Tokarski

ARCADIS GERAGHTY & MILLER

Well Construction Log

(Unconsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project NL Industries/Taracorp Superfund Site

Project # CI001003.0003 Well GMMW-112S

Town/City Granite City

County Madison State Illinois

Permit No.

Land-Surface Elevation and Datum:

_____ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 3/6/00

Drilling Method Hollow Stem Augres 4.25" diameter

Drilling Contractor Phillip Services Corporation

Drilling Fluid None

Development Technique(s) and Date(s)

Surge with bailer and purged 25 gallons.

Fluid Loss During Drilling _____ gallons

Water Removed During Development 25 gallons

Static Depth to Water 18.34 feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

Well Purpose Monitoring

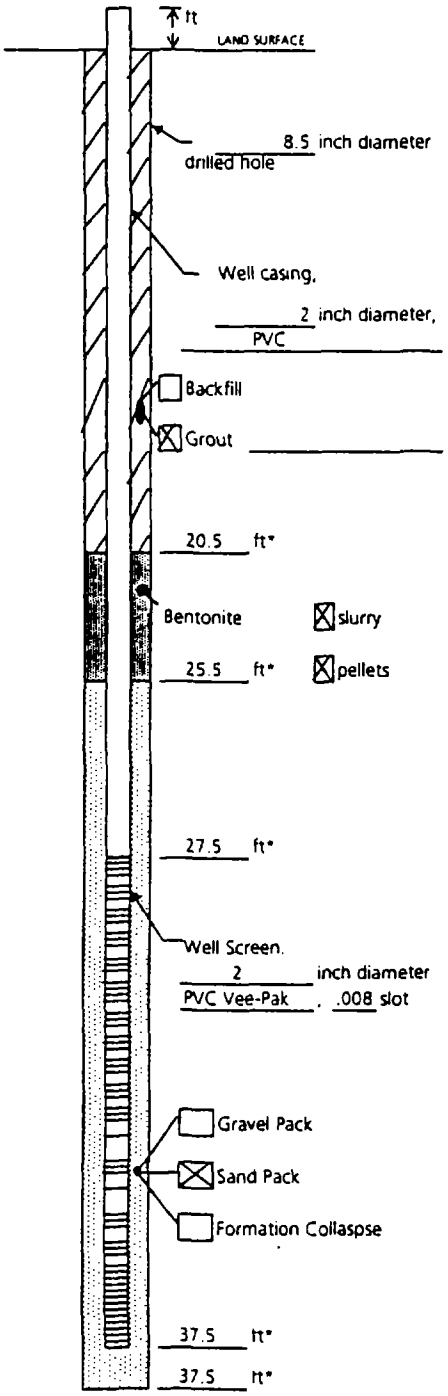
Remarks

Prepared by Adam Tokarski

ARCADIS GERAGHTY & MILLER

Well Construction Log

(Unconsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project NL Industries/Taracorp Superfund Site

Project # CI001003.0003 Well GMMW-112D

Town/City Granite City

County Madison State Illinois

Permit No.

Land-Surface Elevation and Datum:

_____ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 3/6/00

Drilling Method Hollow Stem Augres 4.25" diameter

Drilling Contractor Phillip Services Corporation

Drilling Fluid None

Development Technique(s) and Date(s)

3/16/00, Surge with surge block and purge with submersible pump.

Fluid Loss During Drilling _____ gallons

Water Removed During Development 104 gallons

Static Depth to Water 15.52 feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

Well Purpose Monitoring

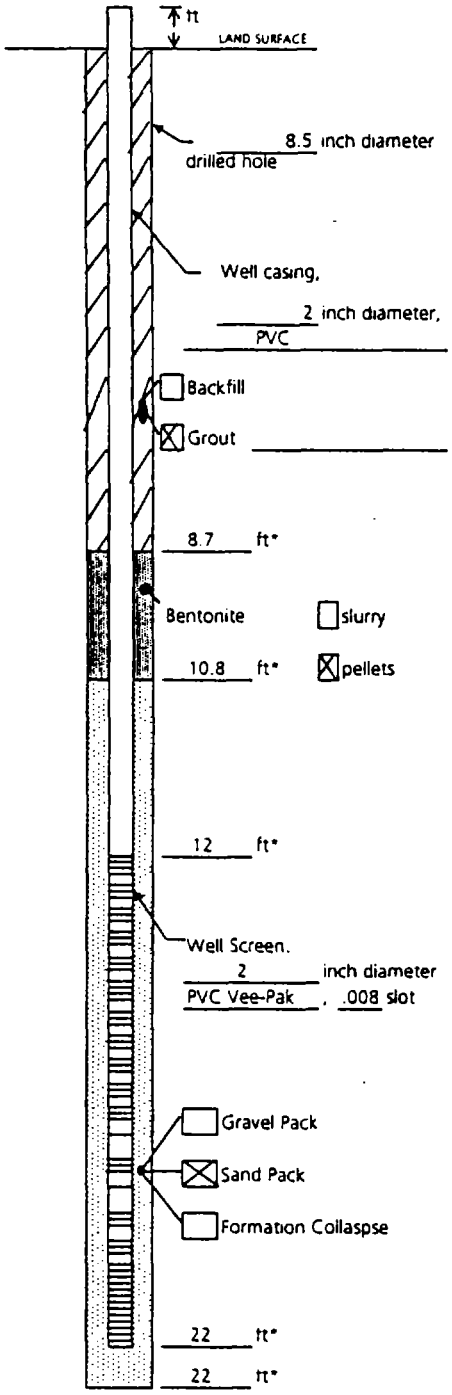
Remarks

Prepared by Adam Tokarski

ARCADIS GERAGHTY & MILLER

Well Construction Log

(Unconsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project NL Industries/Taracorp Superfund Site

Project # C1001003.0003 Well GMMW-113S

Town/City Granite City

County Madison State Illinois

Permit No.

Land-Surface Elevation and Datum:

feet ☐ Surveyed ☐ Estimated

Installation Date(s) 3/15/00

Drilling Method Hollow Stem Augres 4.25" diameter

Drilling Contractor Phillip Services Corporation

Drilling Fluid None

Development Technique(s) and Date(s)

3/18/00, Surge with bailer and purge with submersible pump.

Fluid Loss During Drilling gallons

Water Removed During Development 40 gallons

Static Depth to Water 15.60 feet below M.P.

Pumping Depth to Water feet below M.P.

Pumping Duration hours

Yield gpm Date

Specific Capacity gpm/ft

Well Purpose Monitoring

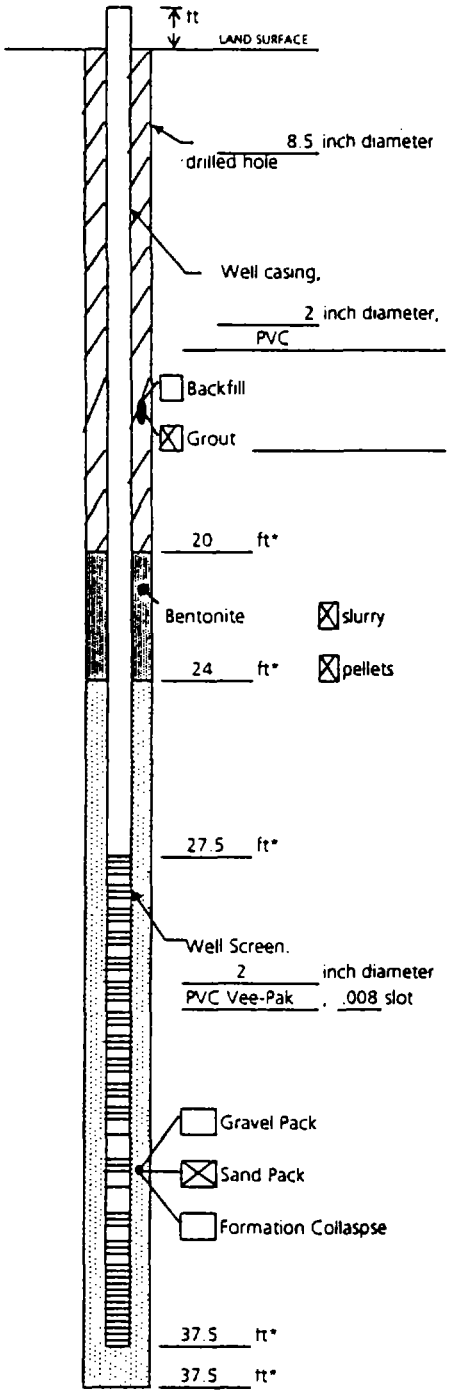
Remarks

Prepared by Adam Tokarski

ARCADIS GERAGHTY & MILLER

Well Construction Log

(Unconsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project NL Industries/Taracorp Superfund Site

Project # CI001003.0003 Well GMMW-113D

Town/City Granite City

County Madison State Illinois

Permit No.

Land-Surface Elevation and Datum:

_____ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 3/15/00

Drilling Method Hollow Stem Augres 4.25" diameter

Drilling Contractor Phillip Services Corporation

Drilling Fluid None

Development Technique(s) and Date(s)

Surge with surge block and purged with submersible pump.

Fluid Loss During Drilling _____ gallons

Water Removed During Development 100 gallons

Static Depth to Water 15 feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

Well Purpose Monitoring

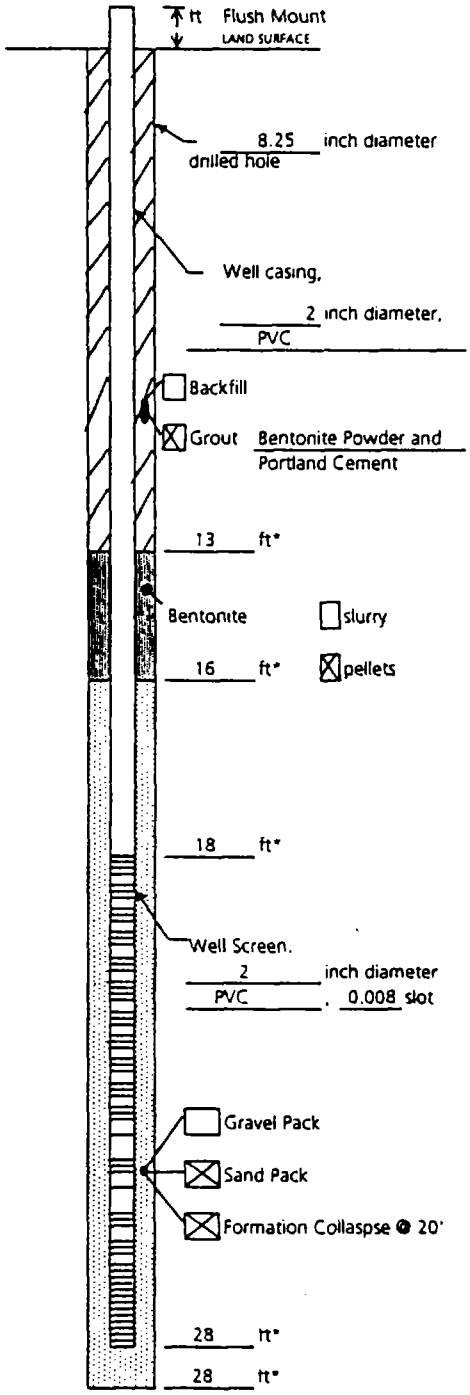
Remarks

Prepared by Adam Tokarski

ARCADIS GERAGHTY & MILLER

Well Construction Log

(Unconsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project NL Industries/Taracorp Superfund Well

Project # CI001003.0003 Well GMGW-115S

Town/City Granit City

County Madison State IL

Permit No.

Land-Surface Elevation and Datum:

NA feet ☐ Surveyed ☐ Estimated

Installation Date(s) 5/16/00

Drilling Method Hollow Stem Augers 4.25" diameter

Drilling Contractor Phillip Services Corporation

Drilling Fluid None

Development Technique(s) and Date(s)

5/20/00 Surge and Pump.

Fluid Loss During Drilling None gallons

Water Removed During Development 50 gallons

Static Depth to Water - feet below M.P.

Pumping Depth to Water - feet below M.P.

Pumping Duration 0.5 hours

Yield - gpm Date -

Specific Capacity - gpm/ft

Well Purpose Monitoring

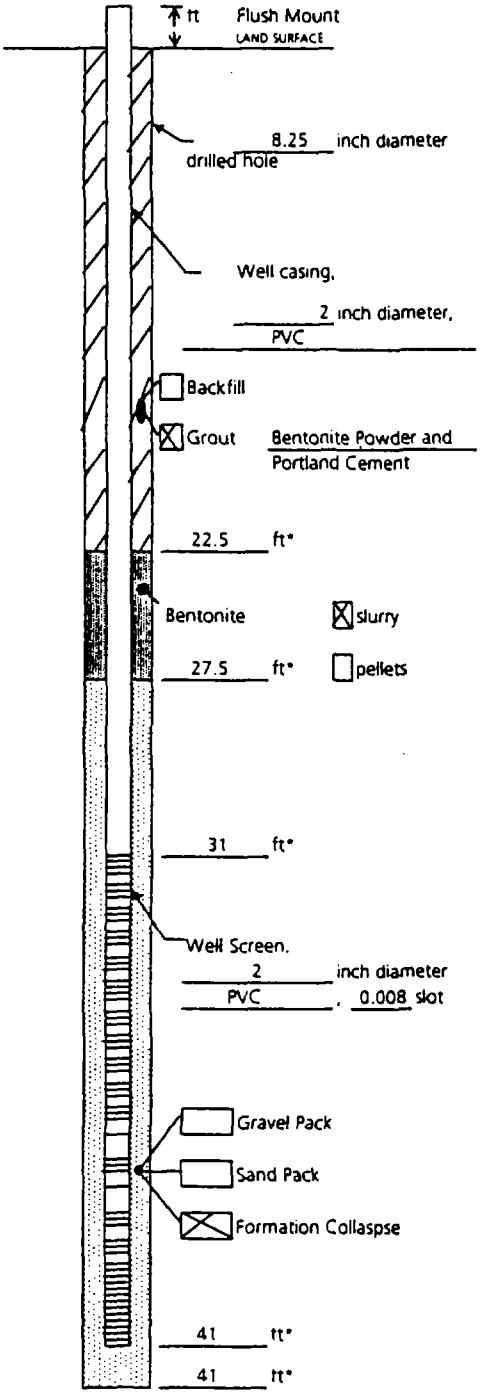
Remarks

Prepared by Adam Tokarski

ARCADIS GERAGHTY & MILLER

Well Construction Log

(Unconsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project: NL Industries/Taracorp Superfund Well

Project #: CI001003.0003 Well: GMGW-115D

Town/City: Granit City

County: Madison State: IL

Permit No.:

Land-Surface Elevation and Datum:

NA feet ☐ Surveyed ☐ Estimated

Installation Date(s): 5/16/00

Drilling Method: Hollow Stem Augers 4.25" diameter

Drilling Contractor: Phillip Services Corporation

Drilling Fluid: None

Development Technique(s) and Date(s)

5/20/00 Surge and Pump.

Fluid Loss During Drilling: None gallons

Water Removed During Development: 100 gallons

Static Depth to Water: - feet below M.P.

Pumping Depth to Water: - feet below M.P.

Pumping Duration: 0.5 hours

Yield: - gpm Date: -

Specific Capacity: - gpm/ft

Well Purpose: Monitoring

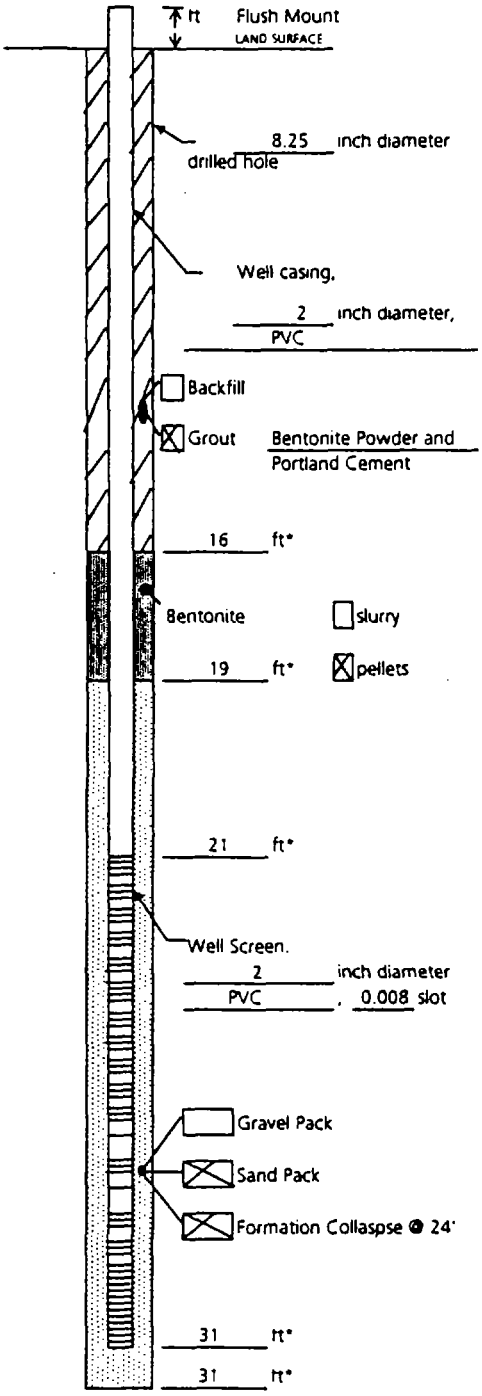
Remarks:

Prepared by: Adam Tokarski

ARCADIS GERAGHTY & MILLER

Well Construction Log

(Unconsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project NL Industries/Taracorp Superfund Well

Project # CI001003.0003 Well GMGW-116S

Town/City Granit City

County Madison State IL

Permit No.

Land-Surface Elevation and Datum:

NA feet ☐ Surveyed ☐ Estimated

Installation Date(s) 5/19/00

Drilling Method Hollow Stem Augers 4.25" diameter

Drilling Contractor Phillip Services Corporation

Drilling Fluid None

Development Technique(s) and Date(s)

5/20/00 Surge and Pump.

Fluid Loss During Drilling None gallons

Water Removed During Development 50 gallons

Static Depth to Water - feet below M.P.

Pumping Depth to Water - feet below M.P.

Pumping Duration 0.5 hours

Yield - gpm Date -

Specific Capacity - gpm/ft

Well Purpose Monitoring

Remarks

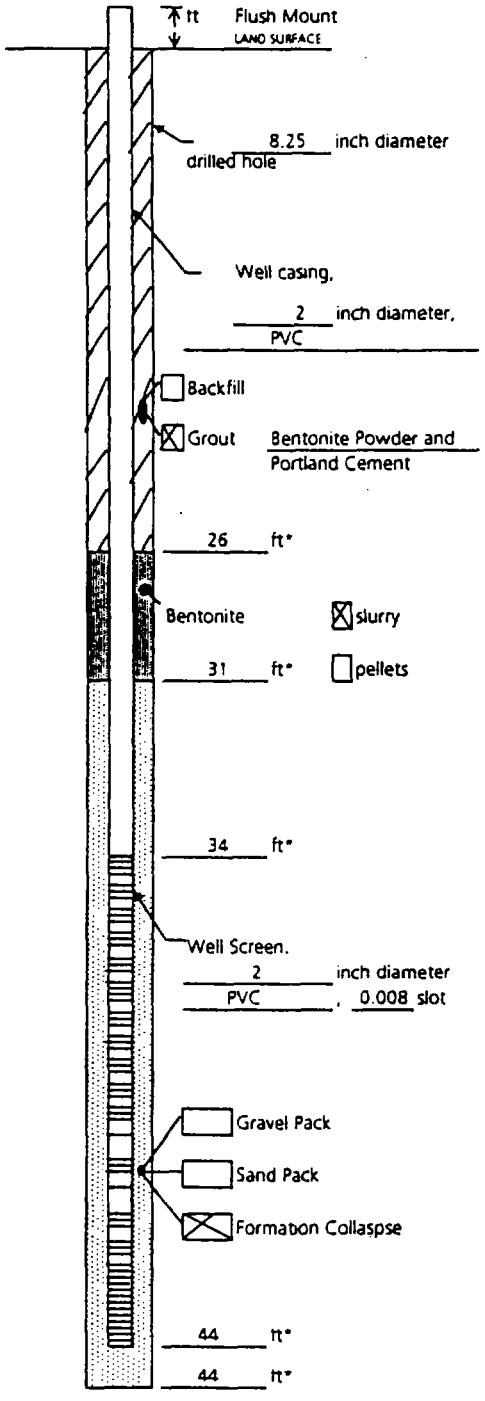
Prepared by Adam Tokarski

GMMW-116S.xls
8/17/00

ARCADIS GERAGHTY & MILLER

Well Construction Log

(Unconsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project NL Industries/Taracorp Superfund Well

Project # CI001003.0003 Well GMGW-116D

Town/City Granit City

County Madison State IL

Permit No.

Land-Surface Elevation and Datum:

NA feet ☐ Surveyed ☐ Estimated

Installation Date(s) 5/22/00

Drilling Method Hollow Stem Augers 4.25" diameter

Drilling Contractor Phillip Services Corporation

Drilling Fluid None

Development Technique(s) and Date(s)

5/20/00 Surge and Pump.

Fluid Loss During Drilling None gallons

Water Removed During Development 125 gallons

Static Depth to Water - feet below M.P.

Pumping Depth to Water - feet below M.P.

Pumping Duration 0.5 hours

Yield - gpm Date -

Specific Capacity - gpm/ft

Well Purpose Monitoring

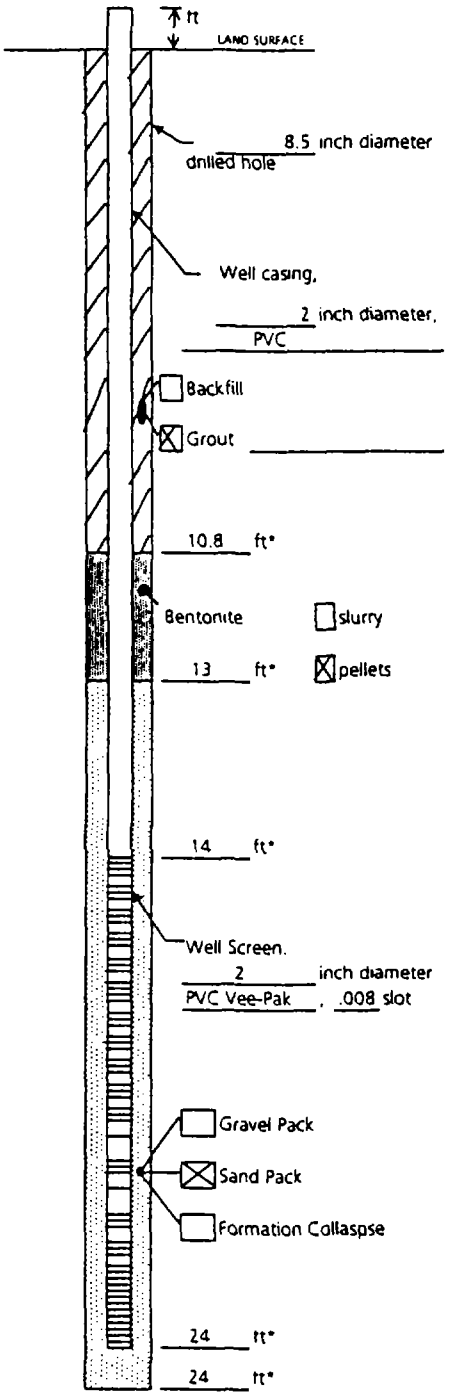
Remarks

Prepared by Adam Tokarski

ARCADIS GERAGHTY & MILLER

Well Construction Log

(Unconsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project NL Industries/Taracorp Superfund Site

Project # CI001003.0003 Well GMMW-117

Town/City Granite City

County Madison State Illinois

Permit No.

Land-Surface Elevation and Datum:

feet ☐ Surveyed ☐ Estimated

Installation Date(s) 3/13/00

Drilling Method Hollow Stem Augres 4.25" diameter

Drilling Contractor Phillip Services Corporation

Drilling Fluid None

Development Technique(s) and Date(s)

3/17/00, Surge with bailer and purge with bailer.

Fluid Loss During Drilling gallons

Water Removed During Development 8 gallons

Static Depth to Water 19.14 feet below M.P.

Pumping Depth to Water feet below M.P.

Pumping Duration hours

Yield gpm Date

Specific Capacity gpm/ft

Well Purpose Monitoring

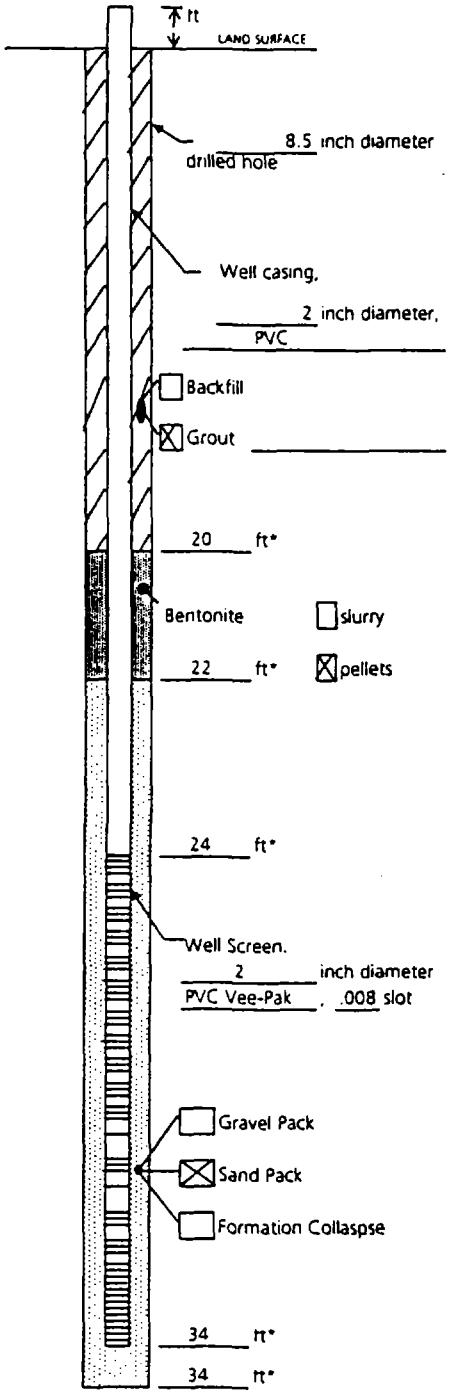
Remarks

Prepared by Adam Tokarski

ARCADIS GERAGHTY & MILLER

Well Construction Log

(Unconsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project NL Industries/Taracorp Superfund Site

Project # CI001003.0003 Well GMMW-118

Town/City Granite City

County Madison State Illinois

Permit No.

Land-Surface Elevation and Datum:

_____ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 3/14/00

Drilling Method Hollow Stem Augres 4.25" diameter

Drilling Contractor Phillip Services Corporation

Drilling Fluid None

Development Technique(s) and Date(s)

3/17/00, Surge with bailer and purge with submersible pump.

Fluid Loss During Drilling _____ gallons

Water Removed During Development 55 gallons

Static Depth to Water 27.94 feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

Well Purpose Monitoring

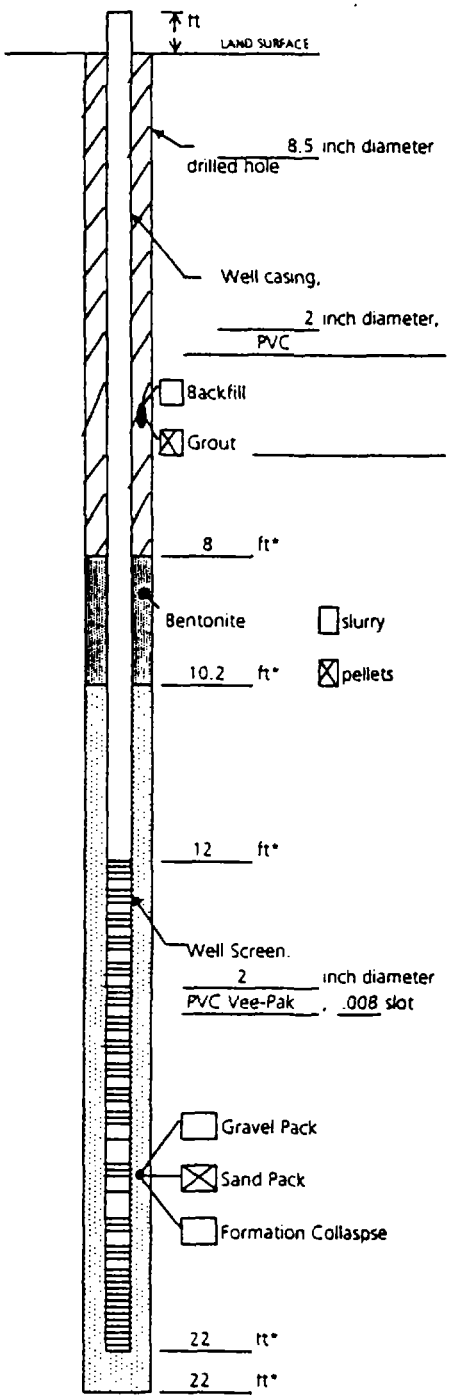
Remarks

Prepared by Adam Tokarski

ARCADIS GERAGHTY & MILLER

Well Construction Log

(Unconsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project NL Industries/Taracorp Superfund Site

Project # CI001003.0003 Well GMMW-119

Town/City Granite City

County Madison State Illinois

Permit No.

Land-Surface Elevation and Datum:

____ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 3/14/00

Drilling Method Hollow Stem Augres 4.25" diameter

Drilling Contractor Phillip Services Corporation

Drilling Fluid None

Development Technique(s) and Date(s)

3/17/00, Surge with bailer and purge with bailer

Fluid Loss During Drilling ____ gallons

Water Removed During Development 6 gallons

Static Depth to Water 15.55 feet below M.P.

Pumping Depth to Water ____ feet below M.P.

Pumping Duration ____ hours

Yield ____ gpm Date ____

Specific Capacity ____ gpm/ft

Well Purpose Monitoring

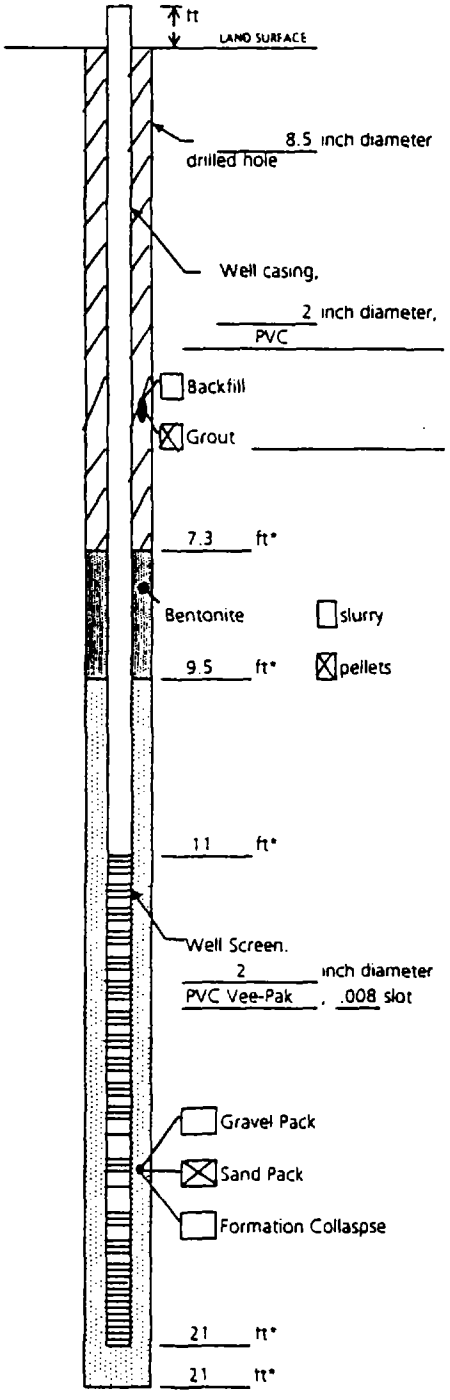
Remarks

Prepared by Adam Tokarski

ARCADIS GERAGHTY & MILLER

Well Construction Log

(Unconsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project NL Industries/Taracorp Superfund Site

Project # CI001003.0003 Well GMMW-120

Town/City Granite City

County Madison State Illinois

Permit No.

Land-Surface Elevation and Datum:

____ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 3/10/00

Drilling Method Hollow Stem Augres 4.25" diameter

Drilling Contractor Phillip Services Corporation

Drilling Fluid None

Development Technique(s) and Date(s)

3/17/00, Surged with bailer and purged with submersible pump.

Fluid Loss During Drilling ____ gallons

Water Removed During Development 60 gallons

Static Depth to Water 12.68 feet below M.P.

Pumping Depth to Water ____ feet below M.P.

Pumping Duration ____ hours

Yield ____ gpm Date ____

Specific Capacity ____ gpm/ft

Well Purpose Monitoring

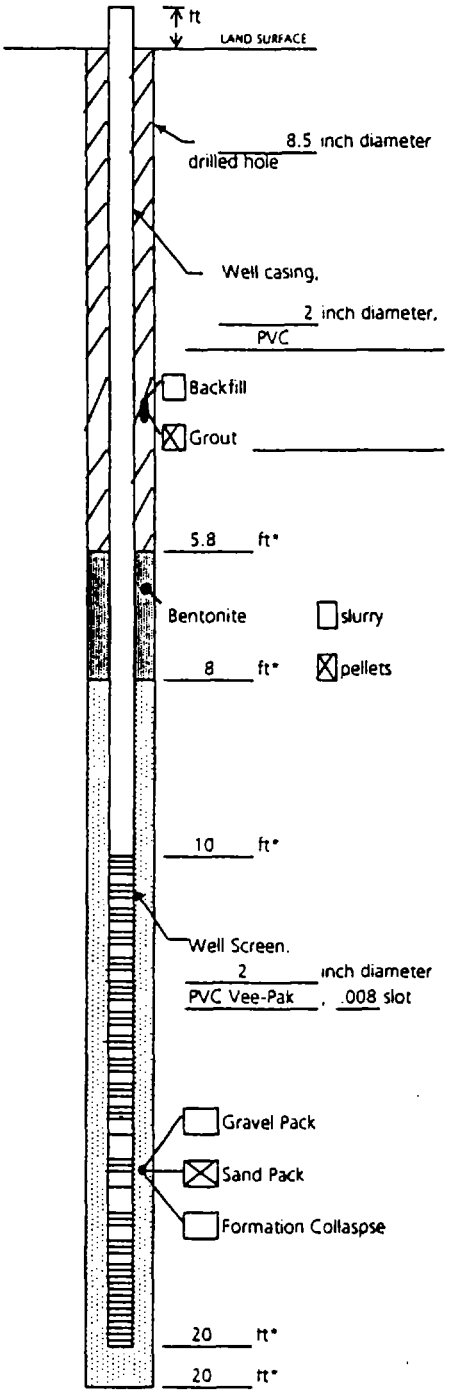
Remarks

Prepared by Adam Tokarski

ARCADIS GERAGHTY & MILLER

Well Construction Log

(Unconsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project NL Industries/Taracorp Superfund Site

Project # CI001003.0003 Well GMMW-121

Town/City Granite City

County Madison State Illinois

Permit No.

Land-Surface Elevation and Datum:

_____ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 3/13/00

Drilling Method Hollow Stem Augres 4.25" diameter

Drilling Contractor Phillip Services Corporation

Drilling Fluid None

Development Technique(s) and Date(s)

3/17/00, Surged with bailer and purged with bailer.

Fluid Loss During Drilling _____ gallons

Water Removed During Development 12.5 gallons

Static Depth to Water _____ feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

Well Purpose Monitoring

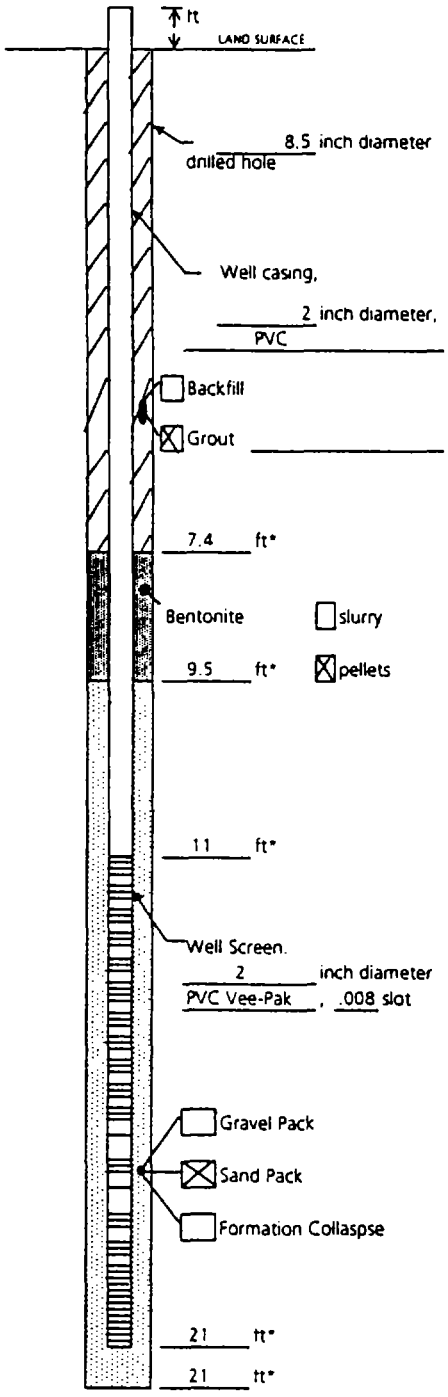
Remarks

Prepared by Adam Tokarski

ARCADIS GERAGHTY & MILLER

Well Construction Log

(Unconsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project NL Industries/Taracorp Superfund Site

Project # C1001003.0003 Well GMMW-122

Town/City Granite City

County Madison State Illinois

Permit No.

Land-Surface Elevation and Datum:

_____ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 3/10/00

Drilling Method Hollow Stem Augres 4.25" diameter

Drilling Contractor Phillip Services Corporation

Drilling Fluid None

Development Technique(s) and Date(s)

3/17/00, Surged with bailer and purged with submersible pump.

Fluid Loss During Drilling _____ gallons

Water Removed During Development 27.5 gallons

Static Depth to Water 12.57 feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

Well Purpose Monitoring

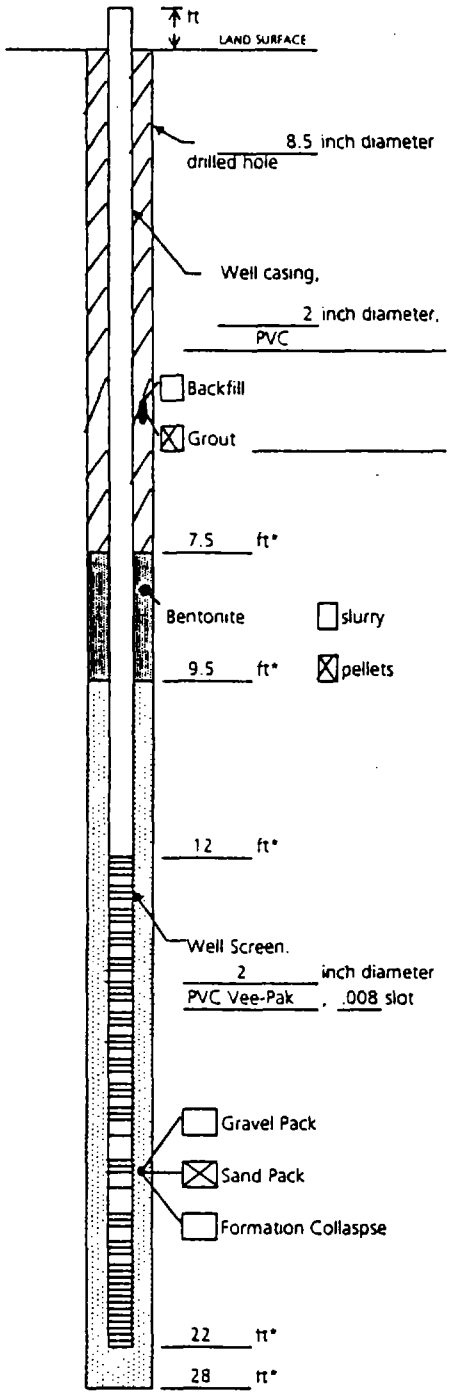
Remarks

Prepared by Adam Tokarski

ARCADIS GERAGHTY & MILLER

Well Construction Log

(Unconsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project NL Industries/Taracorp Superfund Site

Project # CI001003.0003 Well GMMW-123

Town/City Granite City

County Madison State Illinois

Permit No.

Land-Surface Elevation and Datum:

_____ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 3/9/00

Drilling Method Hollow Stem Augres 4.25" diameter

Drilling Contractor Phillip Services Corporation

Drilling Fluid None

Development Technique(s) and Date(s)

3/16/00, Surge with bailer and purged with submersible pump.

Fluid Loss During Drilling _____ gallons

Water Removed During Development 20 gallons

Static Depth to Water 12.61 feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

Well Purpose Monitoring

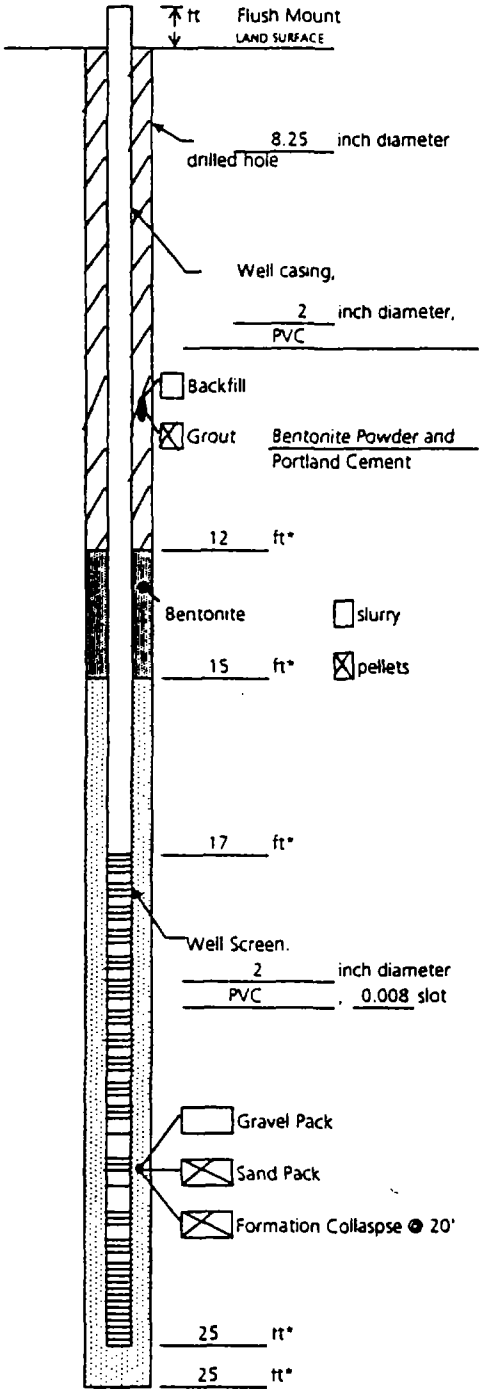
Remarks

Prepared by Adam Tokarski

ARCADIS GERAGHTY & MILLER

Well Construction Log

(Unconsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project NL Industries/Taracorp Superfund Well

Project # CI001003.0003 Well GMGW-124S

Town/City Granit City

County Madison State IL

Permit No.

Land-Surface Elevation and Datum:

NA feet ☐ Surveyed ☐ Estimated

Installation Date(s) 5/17/00

Drilling Method Hollow Stem Augers 4.25" diameter

Drilling Contractor Phillip Services Corporation

Drilling Fluid None

Development Technique(s) and Date(s)

5/20/00 Surge and Pump.

Fluid Loss During Drilling None gallons

Water Removed During Development 90 gallons

Static Depth to Water - feet below M.P.

Pumping Depth to Water - feet below M.P.

Pumping Duration 0.5 hours

Yield - gpm Date -

Specific Capacity - gpm/ft

Well Purpose Monitoring

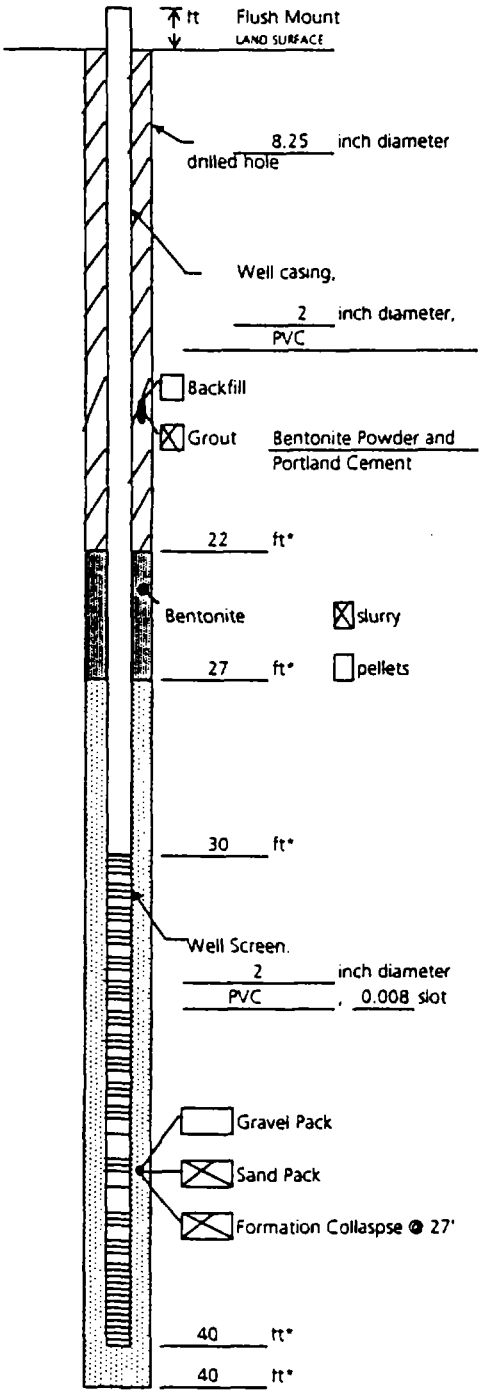
Remarks

Prepared by Adam Tokarski

ARCADIS GERAGHTY & MILLER

Well Construction Log

(Unconsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project NL Industries/Taracorp Superfund Well

Project # CI001003.0003 Well GMGW-124D

Town/City Granit City

County Madison State IL

Permit No.

Land-Surface Elevation and Datum:

NA feet ☐ Surveyed ☐ Estimated

Installation Date(s) 5/17/00

Drilling Method Hollow Stem Augers 4.25" diameter

Drilling Contractor Phillip Services Corporation

Drilling Fluid None

Development Technique(s) and Date(s)

5/20/00 Surge and Pump.

Fluid Loss During Drilling None gallons

Water Removed During Development 100 gallons

Static Depth to Water - feet below M.P.

Pumping Depth to Water - feet below M.P.

Pumping Duration 0.5 hours

Yield - gpm Date -

Specific Capacity - gpm/ft

Well Purpose Monitoring

Remarks

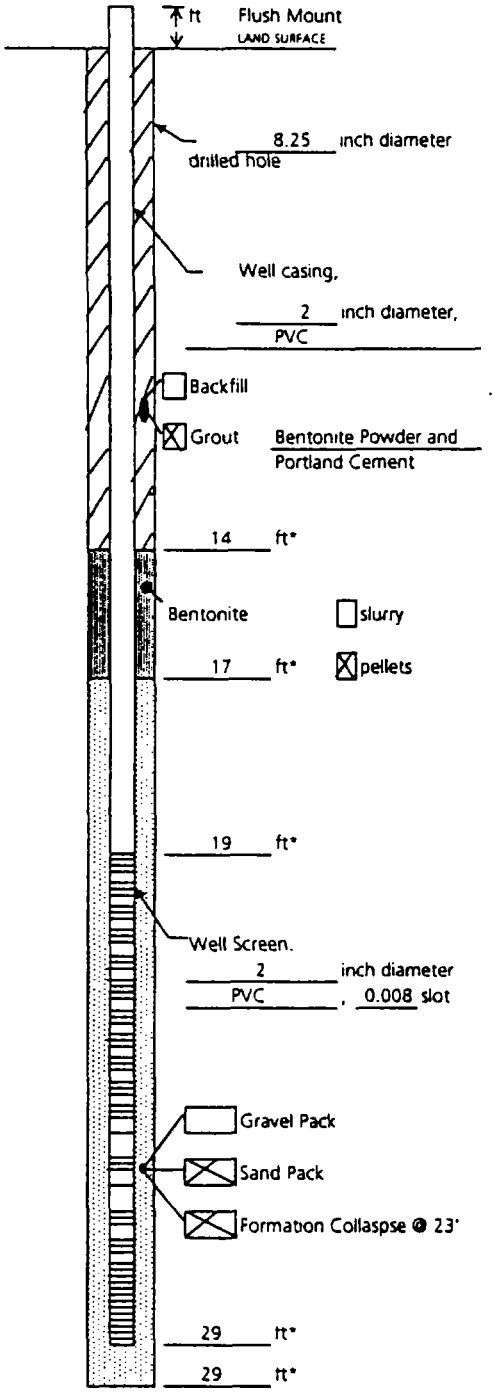
Prepared by Adam Tokarski

GMMW-124D.xls
8/17/00

ARCADIS GERAGHTY & MILLER

Well Construction Log

(Unconsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project NL Industries/Taracorp Superfund Well

Project # CI001003.0003 Well GMGW-125

Town/City Granit City

County Madison State IL

Permit No.

Land-Surface Elevation and Datum:

NA feet ☐ Surveyed ☐ Estimated

Installation Date(s) 5/18/00

Drilling Method Hollow Stem Augers 4.25" diameter

Drilling Contractor Phillip Services Corporation

Drilling Fluid None

Development Technique(s) and Date(s)

5/20/00 Surge and Pump.

Fluid Loss During Drilling None gallons

Water Removed During Development 100 gallons

Static Depth to Water - feet below M.P.

Pumping Depth to Water - feet below M.P.

Pumping Duration 0.5 hours

Yield - gpm Date -

Specific Capacity - gpm/ft

Well Purpose Monitoring

Remarks

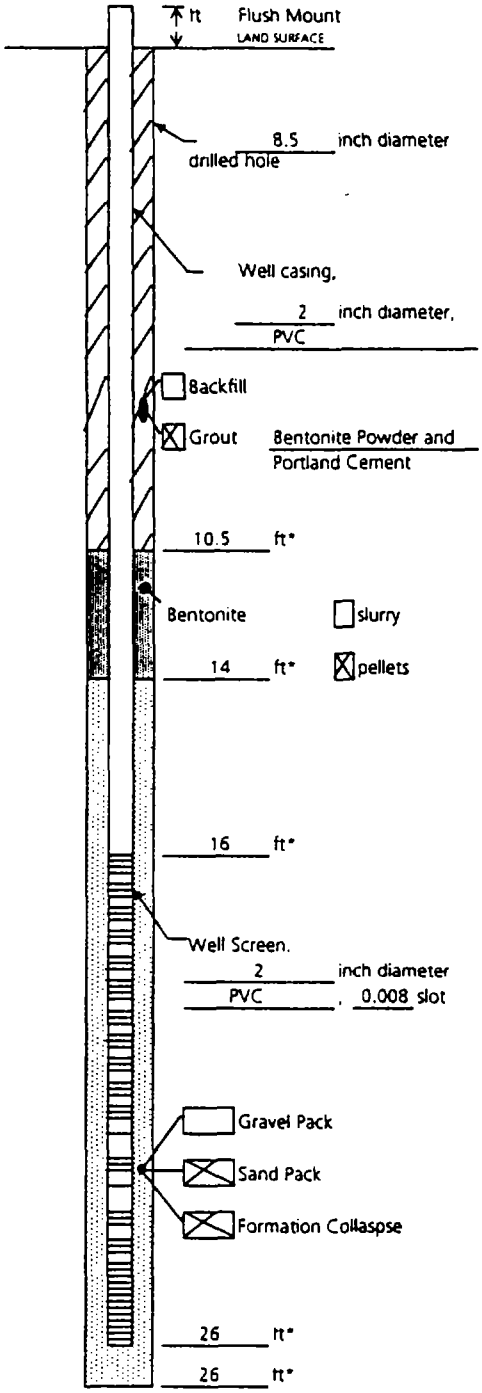
Prepared by Adam Tokarski

Gmmw-125.xls
8/17/00

ARCADIS GERAGHTY & MILLER

Well Construction Log

(Unconsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project NL Industries/Taracorp Superfund Well

Project # C1001003.0003 Well GMGW-128

Town/City Granit City

County Madison State IL

Permit No.

Land-Surface Elevation and Datum:

NA feet ☐ Surveyed ☐ Estimated

Installation Date(s) 7/25/00

Drilling Method Hollow Stem Augers 4.25" diameter

Drilling Contractor Phillip Services Corporation

Drilling Fluid None

Development Technique(s) and Date(s)

5/26/00 Surge block and overpumping with grundfos.

Fluid Loss During Drilling None gallons

Water Removed During Development - gallons

Static Depth to Water - feet below M.P.

Pumping Depth to Water - feet below M.P.

Pumping Duration - hours

Yield - gpm Date -

Specific Capacity - gpm/ft

Well Purpose Monitoring

Remarks

Prepared by Adam Tokarski

Gmmw-126.xls
8/17/00

APPENDIX C

Granite City Wastewater Treatment Plant Discharge Authorization

City of Granite City
Regional Wastewater Treatment Plant

2000 Edison Avenue, Granite City, Illinois 62040
Telephone: (618)452-6229
Fax: (618)452-6245

June 5, 2000

Mr. Adam D. Tokarski
ARCADIS Geraghty & Miller, Inc.
35 East Wacker Drive
Suite 1000
Chicago, Illinois 60601

Dear Mr. Tokarski,

This letter is in response to your request to discharge 3,000 gallons of groundwater collected from monitoring wells for Metalico, Inc. in Granite City.

Review of analytical results indicates that the indicated groundwater falls within the limits of the City's sewer use ordinance. Based on these results, permission is granted to discharge this wastewater to the sanitary sewer in the manner described in your request.

Should you have any further questions or comments, please feel free to contact me at (618) 452-6229.

Sincerely,

Ron Parente
General Foreman of Operations

APPENDIX D

ARCADIS Geraghty & Miller Level II
Laboratory Deliverables for Inorganic Analyses

ARCADIS GERAGHTY & MILLER, INC.
LEVEL II LABORATORY QUALITY ASSURANCE REQUIREMENTS

I. LABORATORY REPORTABLES:

The following information will be included in the data package for each sample where applicable:

A. General Information:

1. The results of sample analysis;
2. The parameters of interest;
3. The method of analysis;
4. The detection limits of analysis;
5. For large numbers of samples per report, a master list of laboratory tracking ID numbers correlated with field sample ID numbers and sample analysis batch identification to correlate QA samples to sample analysis batch;
6. Sample collection date;
7. Sample received date;
8. Sample preparation/extraction data;
9. Sample analysis date;
10. Copy of the chain-of-custody form signed by the laboratory sample custodian;
11. A narrative summary identifying any QA or sample problems encountered, required sample manipulations (dilutions), and the corrective action taken.

Level II Reportables

B. Inorganics Analyses:

For inorganics analyses involving the use of atomic absorption (flame or furnace), inductively coupled plasma (ICP), ion chromatograph (IC), light (visible or ultraviolet) spectrophotometric methods, other turbidimetric, gravimetric, auto analyzer procedures and inorganic procedures generally referred to as "wet bench" chemistry, the following QA data should be provided where applicable.

1. Results of method blanks;

2. Results of batch specific laboratory duplicate or reagent water (blank) spike duplicate (of the compound or element of interest), expected value, percent recovery, calculated relative percent difference (RPD) and control limits;

3. Results of batch specific matrix spikes, expected value, percent recovery control limits, and source;

4. Results of laboratory control sample (LCS) or reagent water (blank) spike sample carried through the preparation method with the samples prior to analysis and analyzed along with the sample in the same analysis batch, expected value, percent recovery, and control limits.

5. Results of the associated initial calibration verification standard (ICVS) and all associated continuing calibration verification standard (CCVS) expected values percent recovery, and control limits.

C. Organics Analyses:

1. Gas Chromatography (GC) Analysis:

The results of the following analyses should be reported where applicable:

a. Blanks:

(1) Water blanks (non-extraction);
(2) Extraction blanks (Laboratory blank);
(3) Trip blanks

Note: Field blanks are treated as samples.

b. Results of batch specific matrix spikes (if required to satisfy the method), expected value, percent recovery, and control limits;

c. Results of batch specific laboratory duplicates or matrix spike duplicates, expected value, percent recoveries, relative percent difference (RPD), and control limits;

d. Results of surrogate spikes, expected value, percent recovery, and control limits;

e. Results of reagent water (blank) spikes and reagent water (blank) spike duplicate of compounds or elements of interest expected value and percent recovery, calculated RPD and control limits. Reagent water (blank) spike duplicate is not required if laboratory duplicate or matrix spike duplicate is analyzed satisfactorily.

2. GC/Mass Spectrometer Analysis:

The results of the following analyses should be reported where applicable:

a. Blanks:

(1) Water blanks;
(2) Extraction blanks;
(3) Trip blanks.

b. Results of batch specific matrix spikes (as required by the method), expected recovery, percent recovery, control limits;

c. Results of batch specific matrix spike duplicates (as required by the method), expected recovery, percent recovery, calculated RPD, and control limits;

d. Laboratory duplicates - optional;

e. Surrogate spikes expected value, percent recovery, and control limits;

f. Results of reagent water (blank) spikes and reagent water (blank) spike duplicate of compounds of interest (or matrix spiking compounds specific for the method), expected value, percent recovery, calculated RPD and control limits.

The following applies to both inorganic (metals and wet chemistry) and organic analyses, where applicable:

If samples are digested, extracted or otherwise prepared together in a batch and analyzed on different instruments or on the same instrument during different calibrations (e.g. on different days) then the laboratory is required to provide the stated deliverables for each analytical batch and for each instrument in the data package report. Included with this deliverable must be identification of which samples were analyzed under which quality control data and on which instrument. If the control samples are only periodically analyzed, then in addition to the stated deliverables the laboratory will be required to provide the initial and continuing calibrations results of the other instruments used for each day samples were analyzed without control samples as appropriate for the analysis, regardless of the level of reporting.

II. LABORATORY NON-REPORTABLES: (LEVEL II)

All raw data and data not included under the reportables described in paragraph I developed by the contracted laboratory during sample analysis must be maintained by the laboratory as a record for a period of three years unless specified otherwise by the contract. Such data may include, but not be limited to, the following:

A. Inorganics Analyses:

1. Concentration of calibration curve standards;
2. Results of linear range check samples for ICP;
3. Results of linear range (1 to 4) dilution sample for ICP;
4. Results of interference check sample (ICS) analysis and expected value (ICP only);
5. Results of analytical (post-digested) spike analysis;
6. Sequential measurement readout records;
7. Digestion logs;
8. Percent solids raw data;
9. Raw data calculation worksheets.

B. Organics Analyses:

Records of the analysis results of the following types of QA samples:

1. Initial calibration data;
2. GC/Mass Spectrometer tuning with BFB or DFTPP and mass calibration summary;
3. Continuing calibration standards including results of system performance check compounds (CCC) and expected results;
4. Response factors and relative retention time for each parameter;
5. Internal standard parameter (compound) and concentration;

6. Sample chromatograms; and

7. Mass spectral data tape for each sample.

NOTE: The laboratory non-reportable inorganic and organic information is not required to be submitted with the laboratory report, but should be available for audit review upon 30-days notice.